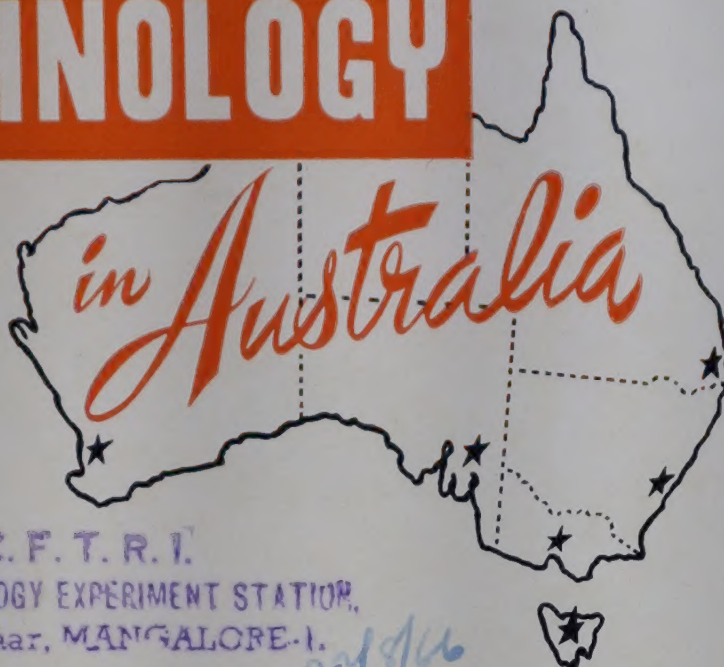




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FOOD TECHNOLOGY



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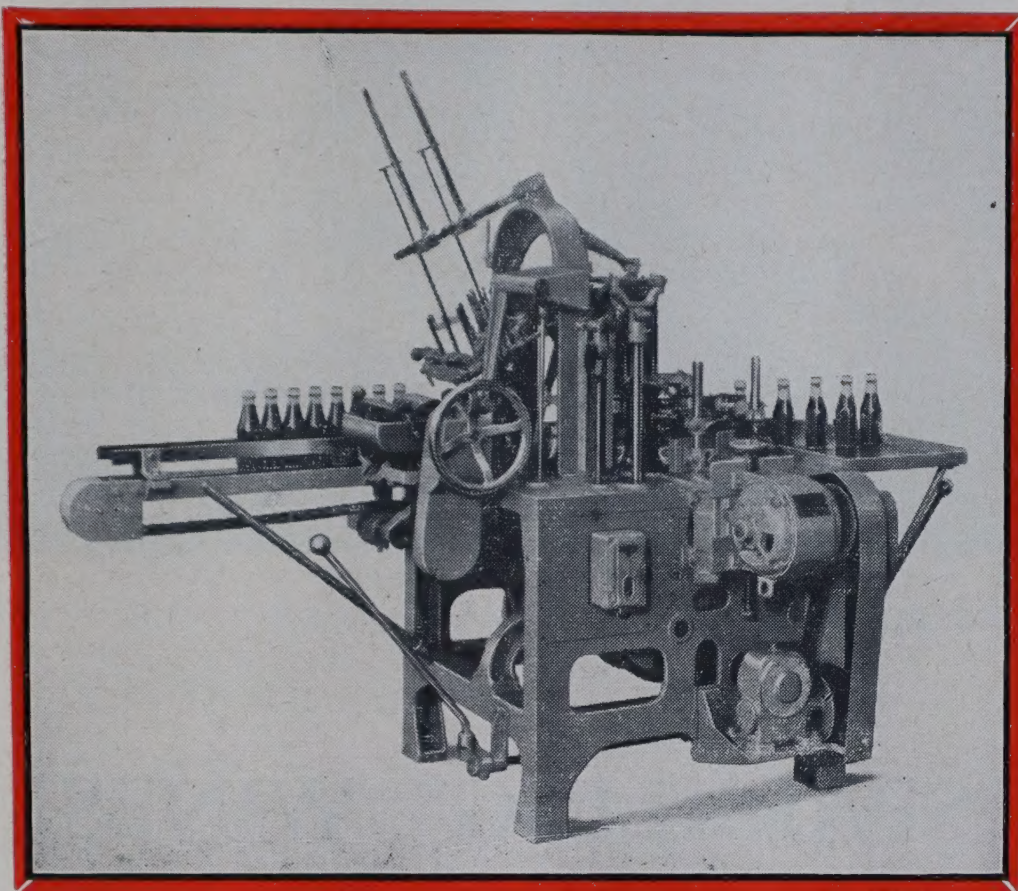
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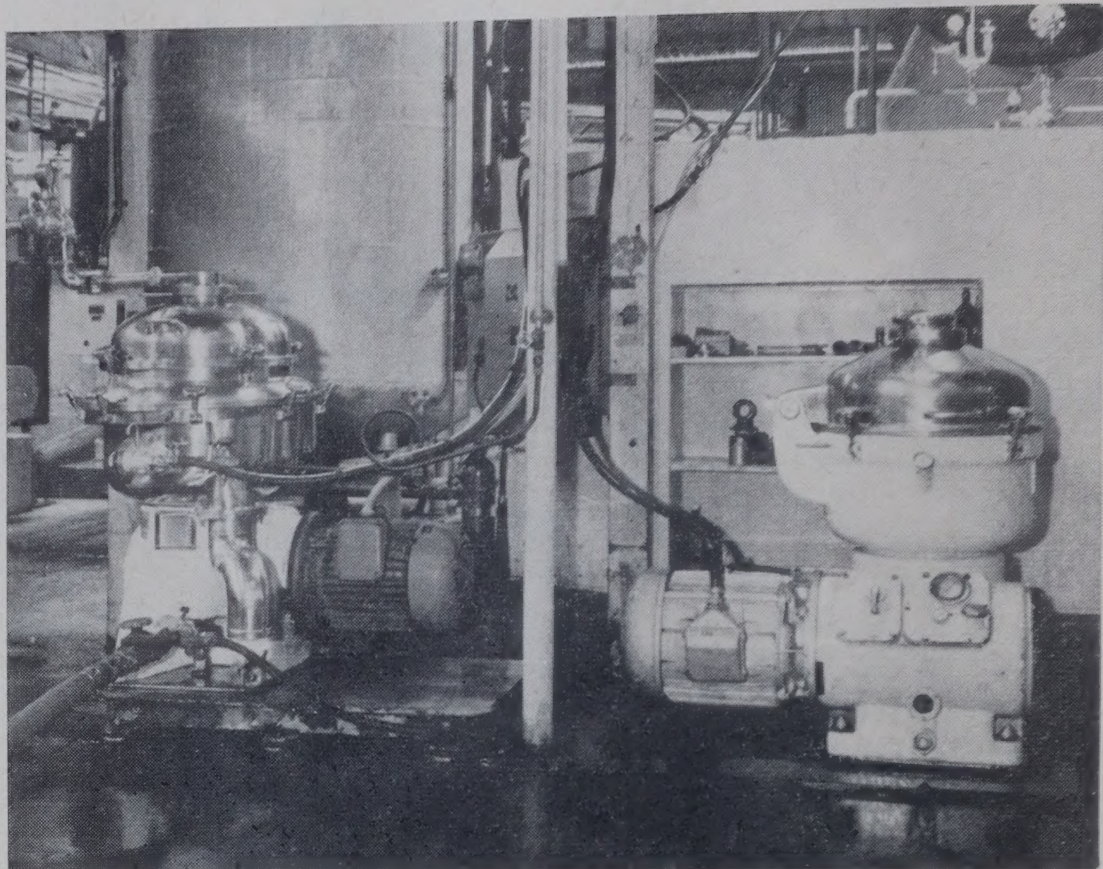


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Editor:

F. H. REUTER, Ph.D., F.R.I.C., F.R.A.C.I.
Associate Professor of Food Technology.
The University of New South Wales.

Business Manager:

S. M. ADAMS.

Office:

12 O'Connell Street, Sydney, N.S.W.
Telephone: 25 5401.

All correspondence to be forwarded to this
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Committee of Management:

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Advertising Manager:

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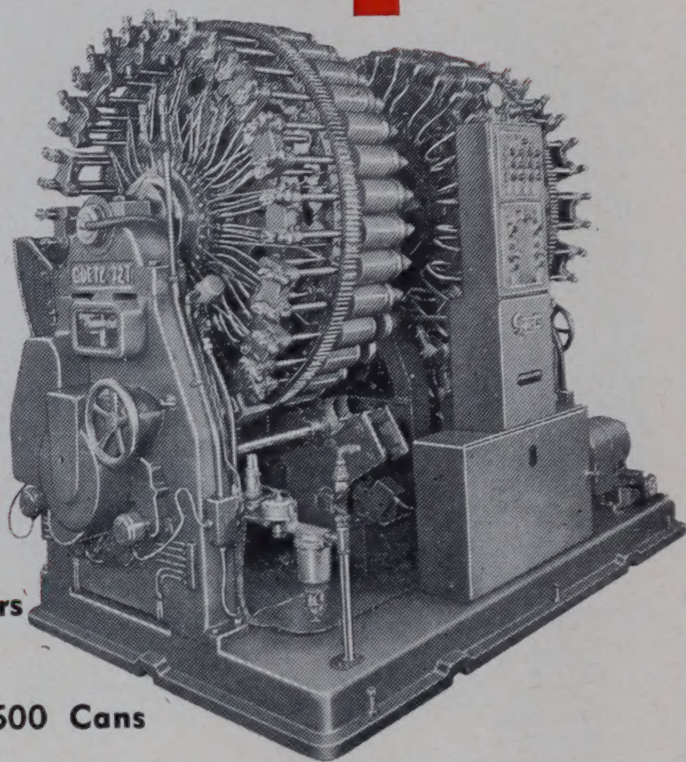
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Food Regulations

In conjunction with the F.T.A.'s work on food regulations, it is often asked: where are we with all the work? What has been achieved? What is being done? What is in the pipe line?

Simple questions are difficult to answer, but a statement from C.A.F.T.A.'s Technical Secretary recently came to hand which gives chapter and verse on the state of affairs as per last November. The following exposition is based on it, and should be read in conjunction with an official statement from the National Health and Medical Research Council regarding the state of adoption of its *Food Standards Recommendations* (p. 49).

It all begins with a draft regulation prepared by C.A.F.T.A.'s Technical Standing Committee (T.S.C.). This may be a complete regulation or only an amendment, and since there is no finality ever in this field, amendments play a significant part in this work. As regards the choice of the subject for new drafts, this may follow a request from the Food Standards Committee (F.S.C.) to C.A.F.T.A. But it may also have been initiated by industry anywhere in the Commonwealth or by a State Health Department. In the latter case, it would have first gone to the Commonwealth Department of Health which would transmit it to C.A.F.T.A. with a request for action.

The following are drafts in course of formulation by T.S.C.:—

Edible Fats and Oils, amendment re Safflower, Sunflower, Rape and Soya Oils,
Ice Cream and Related Products, amendment re continental types Caviare.

When T.S.C. is satisfied with an initial draft, it is submitted to

C.A.F.T.A.'s Uniform Procedure which operates amongst the six F.T.A.'s. Each of these, one in each State, invites members of the industry concerned with the subject of the regulation to let it have its comments on it. Some F.T.A.'s have technical committees to handle matters at this stage, others do without.

It is important to realize that the power to view and criticize these drafts is open to all members of the industry, be they members of an F.T.A. or not. It is however restricted to individual companies and, as a matter of policy, trade associations are not being consulted.

F.T.A.'s then collate comments from industry and transmit them to T.S.C. which considers their impact on its initial draft. T.S.C. produces a new one which again is submitted to industry's scrutiny by way of the F.T.A.'s, and this process is repeated until it produces a final version which is submitted to ballot by the F.T.A.'s. In the case of contentious matters this process of *orbiting* may take quite a long time.

The following drafts are currently within C.A.F.T.A.'s Uniform Procedure:—

Fruit Juices and Conc. Fruit Juices (awaiting decision re comminuted fruit),
Sweetened Fruit Juices (awaiting decision re comminuted fruit),
Sauces and Chutneys,
Fruit (Fresh and Preserved),
Goat's Milk,
Wine,
Flour and Meals,
Vinegar,
Pastry Mix and Pastry.

Thus is produced a C.A.F.T.A. Draft which then is sent to the Com-

— Continued on page 45

PASTEURIZATION OF MILK FOR CHEESE MANUFACTURE

By J. CZULAK,

C.S.I.R.O., Division of Dairy Research, Melbourne

At its 57th Session in May 1964, the National Health and Medical Research Council recommended that the States make it compulsory to pasteurize milk and milk products used for cheese production. When the appropriate regulations will have been passed by the States, the same will of course apply to imported cheeses.

The problem of pasteurization of milk for cheese manufacture has become in recent months a subject of discussion among leaders of the Australian cheese industry and various statutory authorities concerned with the administration and supervision of public health and hygiene. The aim of this article is to recall and interpret the principal aspects of this important issue.

In modern practice in Australia and in overseas countries pasteurization of milk means heating the milk to 162°F and holding it at this temperature for at least 15 sec. This or equivalent thermal treatment is necessary to destroy pathogenic bacteria in the milk. Inactivation of the enzyme phosphatase, present in the milk, is the accepted yardstick of the efficacy of the thermal treatment.

Pasteurization is compulsory for market milk in most developed countries. In the last 20 years pasteurization has been increasingly applied to milk for cheese manufacture for the following reasons:—

- To eliminate pathogenic micro-organisms.
- To enhance the keeping quality of the cheese.

Whilst pasteurization largely brings about these benefits it also

poses a problem in that cheese made from pasteurized milk develops flavour more slowly. Hence, many cheese manufacturers oppose pasteurization and argue that pathogenic bacteria will die during the maturing of the cheese. They quote the U.S.A. regulations which permit the sale of cheese made from non-pasteurized milk provided that the cheese is at least 60 days old.

The validity of this argument must be questioned because numerous scientific studies have shown that pathogenic micro-organisms survive for much longer periods than 60 days, particularly at temperatures below 45°F, at which cheese for long maturing or for export is usually held. This conclusion was reached after much sifting of bacteriological evidence, by Hammer and Babel (1957), to quote:—
"The data available indicate that under certain conditions pathogens may live in dairy products for long periods with various factors influencing the survival time, and also that holding products containing pathogens may not make them safe. Accordingly, attempts to ensure the safety of such a product as raw milk cheese by holding for a given period is open to question. This is especially true when a low holding temperature appears to extend the

period an organism will survive in such a product as cheese and requirements covering the holding commonly ignore the temperature.

"The apparent increase in the number of cheese-borne outbreaks of typhoid during recent years had emphasized the danger of using raw milk for manufacturing purposes. The logical solution of the problem is pasteurization of the milk for cheese; this is in agreement with the widespread use of heat treatment with other dairy products."

In addition, in more recent years attention of the health authorities in various countries has been drawn to the presence of pathogenic staphylococci in cheese which may result in staphylococcal food poisoning. In this connection it will be sufficient to refer to:—

- The finding of large numbers of coagulase positive staphylococci in cheese exported from New Zealand to the U.K. This incident forced the N.Z. cheese manufacturers to pasteurize milk for Cheddar cheese manufacture. It should be noted here that the cheese in question was much older than 60 days.

- The finding, a few years ago, of large numbers of coagulase positive staphylococci in cheese from one N.S.W. cheese factory.

- Recent rejection of a batch of Australian cheese by the health authorities of an importing country because samples of the cheese contained coagulase positive staphylococci.

- The finding by Keogh (1961) of large numbers of coagulase positive staphylococci in Cheddar cheese made from raw milk; the cheese was 7 months old.

- The outbreak in recent years in the U.S.A., of staphylococcal food poisoning, affecting 200 persons as reported by Hendricks, Belknap and Hausler (1959); the Cheddar cheese involved was 4·8 months old. Another outbreak, caused by Colby cheese, was reported by Allen and Stovall (1960).

The opponents of pasteurization of milk for cheese manufacture also argue that it is not possible to make some types of cheese from pasteurized milk. This argument is not supported by factual evidence. To the contrary, it is known that large-scale manufacturers of cheese in Western Europe are pasteurizing the milk irrespective of the variety of the cheese made. They are of the opinion that pasteurization poses some problems in the manufacture but that these can be overcome and that more uniform quality and lesser incidence of spoilage outweighs this disadvantage.

Other opponents of pasteurization point out that cheese made from effectively pasteurized milk may still contain pathogenic bacteria due to contamination in subsequent stages of manufacture.

This is true but not sufficiently relevant because:—

- Post-pasteurization contamination by some of the pathogenic bacteria is uncommon.

- The population of the pathogenic bacteria arising from post-pasteurization contamination is relatively small.

- It is possible to avoid post-pasteurization contamination by strictly hygienic procedures.

- It is already necessary to eliminate not only pathogenic bacteria but also *E. coli* from cheese exported to some overseas markets.

All the above facts and considerations lead to the following conclusion:—

Until an acceptable and equally effective treatment is found, pasteurization of milk for cheese manufacture should be obligatory. All arguments against pasteurization exaggerate the disadvantages and gloss over the risks involved. These risks are: (a) public health hazards; (b) loss of goodwill and sales on the home market, if the consumers become aware of these hazards; (c) loss of goodwill on the export markets which demand

pathogen free cheese; (d) There are also aesthetic and ethical considerations which a modern cheese industry can ill afford to ignore.

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 Keogh, Barbara P., (1961). Personal communication.

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PROGRAMME

WHAT ARE THE PROBLEMS? 28th October. To remedy the **hunger** problems facing them, underdeveloped countries **must** develop; how are the various aid programmes to help such countries to help themselves? — Professor F. H. Reuter, Department of Food Technology, The University of N.S.W.

HUNGER AND AGRICULTURAL PLANNING. 4th November. The basic assumption of this lecture, indeed of the series, is that the world **can** feed itself. A substantial percentage of the world's crops, at present and in the immediate future, is being wasted; how can we inhibit such wastage? — J. F. Kefford, C.S.I.R.O. Division of Food Preservation, Ryde, N.S.W.

HUNGER AND POPULATION PROBLEMS. 19th November. How are hunger problems related to the distribution of population; how do religious and other taboos make the problems more acute? — Dr. J. C. Caldwell, Department of Demography, Australian National University, Canberra.

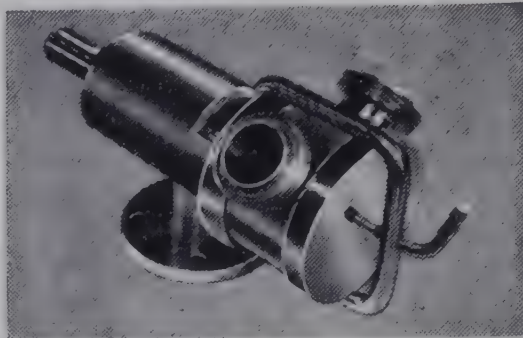
SOLUTIONS: NEW SOURCES OF FOOD-STUFFS. 25th November. What are the new sources of foodstuffs; do they contain the nutrients essential for a proper diet? — Dr. F. J. Moss, Department of Biochemistry, The University of N.S.W.

*The Workers' Educational Association is an independent, non-profit making body which in partnership with the University of Sydney organizes activities in adult education in N.S.W.

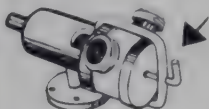
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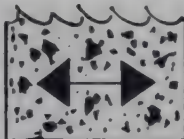
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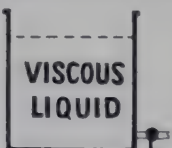
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National Health and Medical Research Council

POINTS FROM THE REPORT ON THE 57th SESSION, MELBOURNE, 28th MAY, 1964

DIETARY HABITS OF SCHOOL CHILDREN

The Council considered that the incidence of dental caries is related to the types of food eaten and the pattern of eating, and that in particular sticky carbohydrate rich foods consumed at frequent intervals between meals will result in an increase in the incidence of dental caries. The Council therefore recommended that the Commonwealth and States give consideration to influencing those responsible for school tuck shops to reduce the sale of such items.

PASTEURIZATION OF LIQUID WHOLE EGGS

Council approved the principle of pasteurization of whole egg pulp at 148°F for 2½ minutes and cooling to 38°F for storage, strongly recommended that this principle be adopted for all egg pulp produced in Australia, and recommended that the standard to be adopted should be not less than that required by the United Kingdom.

FOOD ADDITIVES

Council approved the following recommendations on food additives* :—

*It should be noted that Council's approval of the use of an additive in a certain concentration in a specific food has no legal significance as regards industry's ability to employ this additive in the manufacture of this food. An additive can legally only be used after the appropriate State or Commonwealth food regulation has been issued. This will normally follow the preparation of an N.H. & M.R.C. Draft Food Standard by Council's Food Standard Committee. — The Editor

ASCORBIC ACID AS A BREAD IMPROVER

Ascorbic acid be permitted in flour for bread baking purposes, in a proportion not exceeding 100 ppm based on the weight of the flour.

BENZOIC ACID IN FISHMARINADES

(i) Benzoic acid and/or sorbic acid be permitted as a preservative in fishmarinades in an amount not exceeding 1,000 ppm.

(ii) Fishmarinades should have attached thereto, a label bearing the words "*Store at a temperature of 50°F or below*".

DYEING OF SKINLESS FRANKFURTS

The dyeing of skinless frankfurts be not permitted.

ESSENCES

Diacetin and propylene glycol be permitted for use as solvents in essences.

PEELED POTATO PRESERVATIVE

Whole peeled potatoes may contain sulphur dioxide in a proportion not exceeding 50 ppm and if potatoes are so treated for retail purposes, the label must bear a statement that they have been treated with sulphur dioxide.

PHOSPHATES IN FISH FILLETS AND POULTRY

"Alkali metal polyphosphates be permitted in an amount not exceeding 0.3 per cent w/w (calculated as P₂O₅) in frozen fish fillets and frozen poultry meat."

FOOD STANDARDS COMMITTEE

Council approved the following food standards recommendations:—

CHEESE

That the draft standard* for cheese be forwarded to the State and Territory Food Advisory Committees for adoption.

DIETETIC, SPECIAL DIET AND INVALID FOODS

That the draft standard* for those foods be forwarded to the State and Territory Food Advisory Committees for adoption.

MEAT AND MEAT PRODUCTS

That the amended draft standard* for meat and meat products be forwarded to State and Territory Food Advisory Committees for adoption. This draft standard should now replace the one previously issued and amended by the Council.

MEAT PIES

Council considered that a standard for meat pies was necessary, but that the details of this standard should be left to the option of each State or Territory.

SOFT DRINKS

That the draft standard* for soft drinks be forwarded to the State and Territory Food Advisory Committees for adoption.

TYPE SIZE IN LABELLING

That the draft standard for type size in labelling, as shown in the Appendix be forwarded to the State and Territory Food Advisory Committees for adoption.

VITAMINS AND MINERALS

That the draft standard for vitamins and minerals approved by Council in 1962 (report of 56th Session, pages 42, 43) be amended by the addition of the following to Table 2:—

Foodstuff	Reference Quantity
<i>"Biscuits containing not more than 20 per cent fat no more than 5 per cent sugar 4 oz"</i>	

*The full text of the standard is given in an appendix to the Report.

VETERINARY PUBLIC HEALTH COMMITTEE

The following recommendations derived from the Veterinary Public Health Committee report were approved by Council:—

HYGIENE AT ABATTOIRS

The following additional recommendations were added to those made at the 56th Session of Council (page 44 of Report):—

(i) That special attention should be given to the chilling of meat as soon as possible after slaughtering and dressing.

(ii) While increasingly high standards of abattoir hygiene are now becoming mandatory for the meat export trade, the Council considers that, within the bounds of practicability, similar standards should be insisted upon in the preparation of meat for the home market.

OTHER MATTERS

FORMATION OF NEW SUB-COMMITTEE

The formation of the following new Sub-Committee was approved:—

*ad hoc Frozen Foods Code
Sub-committee:*

"To draw up a practicable code for the handling of frozen foods and report to the Food Standards Committee."

Membership until 31st December, 1965:—

Mr. J. Warry, Chemist, Commonwealth Department of Health (Chairman).

Mr. R. C. Stanhope, Chief Analyst, Department of Public Health, Victoria.

Dr. J. Vickery, Chief of Division of Food Preservation, C.S.I.R.O., Ryde, New South Wales.

Mr. W. Madgwick, Chief Food Inspector, Department of Public Health, New South Wales.

Mr. S. L. Guilfoyle, Metropolitan Refrigeration Services, 17 Bedford Street, North Melbourne.

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MISUSE OF VITAMIN PREPARATIONS

A letter from the Australian Medical Association was tabled at the 56th Session of Council requesting a statement by the Council on the misuse of vitamin preparations. The matter was considered by the Nutrition Committee and Medicine Advisory Committee, and Council approved the following statement:—

"As the standard of living has improved in Australia and as knowledge about what constitutes a balanced adequate diet has reached the housewives, overt nutritional deficiency conditions have almost disappeared. Healthy people who eat a balanced diet in one of the many dietary patterns now common in Australia will obtain their requirements of all nutrients and will derive no benefits from a vitamin-mineral preparation.

"Food faddists, chronic alcoholics, patients with metabolic disorders or diseases which interfere with absorption or utilization of nutrients will need to be assessed on their clinical condition and treated accordingly.

"From enquiries made it would appear that vitamin-mineral preparations are being widely used as placebos. Advertising by manufacturers has undoubtedly endowed these preparations with some measure of mysticism or charm — perhaps enhancing their value to the patient. These preparations serve a useful purpose in the management of some patients; however, as with all forms of placebo, vitamin-mineral preparations are not a substitute for care in diagnosis. It is seldom that nerves, malaise, depression, and a host of other vague inadequate symptoms are due to vitamin or mineral deficiency, and any benefits from vitamin-mineral preparations are likely to be transitory.*

*Placebo — (med.) medicine given to humour, rather than cure the patient. ("O.E.D.", 1964).

"Large doses of vitamin D are toxic. For some time it has been recognized that prolonged medication with large doses of vitamin A may be dangerous. There is now some evidence to suggest that large doses of vitamin C may condition the body so that it becomes vulnerable when these large doses are suspended and an infection supervenes. Fluoride should not be added to vitamin and mineral preparations because some water supplies contain adequate fluoride."

APPENDIX

RECOMMENDED STANDARD FOR TYPE SIZE IN LABELLING

FACE DEPTH

A reference to the size in which letters, words or figures may or shall be printed shall, unless the contrary intention appears, be expressed in terms of decimal divisions of an inch and be read as a reference to the size of a capital letter printed in that size and measured in full depth. The full depth of the printed capital letter shall be measured without regard to the size of the type body from which the letter may be printed or to the size of any beard or shoulder on the type body.

Where a lower-case letter is required to be, or may be printed, the "x" height of the lower-case letter shall be not less than one-half of the full depth of the capital letter with which it is associated in the printing of the letters or words required to be printed in a specific size.

Wherever the wording "of not less than (number) point measurement" or the wording "of not less than (number) point face measurement" appears in State food legislation, it shall be replaced by the wording "with a face depth of not less thanof an inch", the face depth to be expressed in 32nd of an inch.

The Australian 1964 harvest of Currants, Sultanas and Raisins (103,778 tons) was a near record. Highest tonnage produced was in 1944 — 104,261 tons.

F.D.A. PROPOSES REGULATIONS FOR FLAVOURINGS

Regulations to prescribe conditions for the safe use of several hundred natural and synthetic flavouring substances and their adjuvants have been proposed by the Food and Drug Administration.

The substances involved have been widely used in food processing for many years and for that reason have been exempted from the preclearance requirements of the food additives amendment of 1958 pending the issuance of appropriate regulations for use.

In a proposed food additive regulation published in the Federal Register of May 27, F.D.A. listed more than 600 synthetic flavouring substances which it has concluded are safe for use under prescribed conditions.

In another proposal published in the Federal Register of June 9, the agency listed over 100 natural flavouring substances and adjuvants which it also considers safe for use as food additives.

Both proposed regulations would specify that the flavouring substances

be used in the minimum quantity required to produce their intended effect, and otherwise in accordance with all the principles of food manufacturing practice, and

be used alone or in combination with other flavouring substances that are generally recognized as safe, have previously been sanctioned for use, or are controlled by the food additive regulations.

Regarding the synthetic flavourings listed in the May 27 proposal, F.D.A. said it considered the substances safe for these reasons:—

—Experience based on their common use prior to 1958.

—The fact that many of them have a natural counterpart in food or in natural substances used to flavour foods.

—The fact that the safety of selected synthetic flavourings has been established by scientific studies.

—Because relatively low and self-limiting quantities are involved when the substances are used in food, consistent with good manufacturing practice.

In concluding that the natural flavourings listed in the June 9 proposal are safe, F.D.A. said it had relied in part upon experience based on their common use before 1958, and on metabolic and toxicity studies of synthetic flavours that occur in many natural substances used as flavours.

Frozen Food Display Cabinets

The first meeting of a committee of the Standards Association of Australia, Sydney, established to prepare standards covering the design, manufacture, testing and other aspects of refrigerated display cabinets used for the retailing of frozen food was held in Sydney recently. The Chairman of the committee is Professor F. H. Reuter, Department of Food Technology, The University of New South Wales.

The committee discussed the effect of changes in storage temperatures of the life of frozen foods and the aspects which would require to be covered in the proposed standard.

The committee adopted as a general principle that frozen food should be maintained at or below 0°F in such cabinets.

A small sub-committee has been formed to conduct initial drafting.

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FLAVOUR EVALUATION

Sensory Testing of Differences in Taste

I. METHODS SENSORY TESTING OF DIFFERENCES IN TASTE

II. SELECTION OF PANEL MEMBERS

The first article discusses control of environmental conditions and the test method as factors which affect the precision of this testing technique. Methods used for evaluating flavour differences are discussed. These methods include triangle, paired-comparison, duo-trio, multiple-comparison, scoring, ranking, single-stimulus, descriptive term, dilution, and flavour-profile tests. The objectives of the difference test often influence the test method selected.

The second article discusses selection of panel members as a factor which affects the precision of the difference tasting test. Factors which cause variability of taste acuity among individuals are discussed. A total of 102 references are cited in these articles.

E. H. Dawson, J. L. Brogdon, and S. McManus (Human Nutritional Research Div., Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, Md.). "Food Technology", (Sept., Oct., 1963).

●

Freeze-Dried Foods Flavour Ratings

A taste panel of the U.S. Department of Agriculture (U.S.D.A.) and food scientists of its Agricultural Research Service (A.R.S.) rated the consumer quality of freeze-dried foods now on the market; beef, pork, chicken, seafoods, soups, and mixed dishes. They classified 18 products as good or better than their canned or frozen counterparts; ten other commercial freeze-dried foods were judged acceptable.

The taste-panel rated the foods for general palatability, appearance,

flavour, juiciness, texture, and tenderness.

Three foods prepared from freeze-dried products were rated better in eating quality than frozen or canned counterparts — beef noodle soup, chicken noodle soup and shrimp creole. The following freeze-dried foods were rated about equal to frozen or canned products: various soups, creamed chicken, ham sausage, Swiss steak, and shellfish.

These are the conclusions of the panel concerning the standing of freeze-dried foods:—

Beef — in general, somewhat inferior to canned food.

Chicken — slightly lower than those of the canned forms.

Seafoods — about the same as the frozen products; the only low scores were for *fishy* flavours.

Soups — as good as or better than the canned soup.

Combination dishes — good rating except for peas.

(Details of the study can be found in the publication "Freeze-Dried Foods: Palatability Tests" — No. 617, M.R.R. — from the Division of Information, U.S. Department of Agriculture, Washington, D.C., 20250.)

●

Relationship of Peroxide Value and Thiobarbituric Acid Value to Development of Undesirable Flavour Characteristics in Fats

A comparison of the peroxide and thiobarbituric acid values with flavour scores for a series of different fats, with and without added monoglyceride and with and without added stabilizers was presented by W. D. Pohle, R. L. Gregory, and B. Van Giessen of Swift & Co., Chicago, Ill., at the 37th Annual Meeting of the American Oil Chemists Society at Minneapolis, Minn., (October, 1963). Results showed that flavour scores cannot be estimated from either of these values. However, either of the methods can be used to follow the development of off-flavour in a given product although the relative level may vary with the particular product.



Pectic and Proteolytic Enzymes

By D. W. GROVER,

M.B.T. Research Laboratories, Sydney

APPLICATIONS

Pectic Enzymes

Fruit Juice Extraction

Juice Clarification

Wine Making

Proteolytic Enzymes

Meat Tenderizing

Baked Cereal Goods

Brewing, Cheese Making

CLASSIFICATION

These enzymes, like amylases, lipases and most other industrially important enzymes, are hydrolytic enzymes, catalyzing hydrolysis of the substrate. This may cause either

(iii) commercial preparations

(iv) main applications

PECTIC ENZYMES

SUBSTRATE

Pectic substances consist of polygalacturonic acid chains, more or less methylated, with varying degrees of ionization and cross linkage. They are of plant origin, performing an important structural function in most fruits and vegetables. The native substance in the living plant material, called *protopectin*, is highly cross-linked and consequently insoluble in water and other solvents. Prolonged extraction

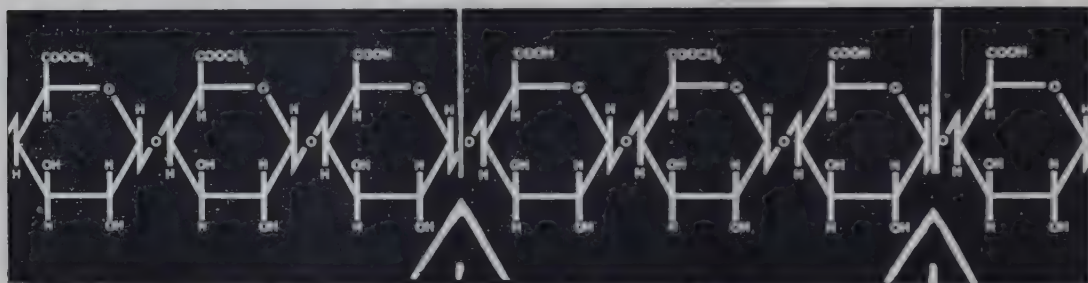


FIG. 1

a rupture of the chain-like pectin or protein molecules, or the removal of side-chains. Commercial preparations offered to the food and other industries always contain a mixture of the main class of enzyme (pectic and proteolytic respectively), together with a variety of other enzymes in varying amounts. When these facts are considered alongside the complexity of the food substrates on which they are required to act, it is understandable that enzyme technology contains a large element of empiricism.

This short address covers the following features:—

- (i) substrate
- (ii) specificity and nomenclature

with dilute acid results in the soluble *pectinic acids*. These contain a considerable proportion of methylated carboxyl groups (Fig. 1). The remaining *free* carboxyl groups are ionized to a degree depending on the pH of the solution and the concentration of K^+ , Na^+ , Ca^{++} , etc. Pectinic acids, owing to their high molecular weight and tendency to cross-link, are responsible for the jelly formation and viscosity of jams, fruit jellies, tomato juice and other fruit products. Replacement of a sufficient proportion of methyl groups by hydrogen results in low

An address to the 13th Convention of the Institute of Food Technologists, Australian Regional Sections, Mildura, Vic., 1963.

methoxyl pectin which has an enhanced tendency to gel by cross linkage in the presence of hydrogen ions and polyvalent cations. Complete removal of methyl groups gives *pectic acids* (polygalacturonic acids), which are insoluble under mildly acid conditions and form completely insoluble salts with *e.g.* calcium.

SPECIFICITY AND NOMENCLATURE

Two kinds of enzymic hydrolysis of pectinic acid can be brought about by distinct enzyme types.

PECTINESTERASES (PE) —

These catalyze the hydrolysis of the methyl ester linkage, giving methanol and pectic acid.

POLYGALACTURONASES (PG) —

These catalyze the hydrolysis of the α -1, 4 linkages within the molecular chain, causing a reduction in chain length, and a consequent fall in the viscosity of the substrate.

PG enzymes are subdivided into those which break the chain more or less at random (the endo-enzymes) and those which remove terminal units (the exo-enzymes). This is parallel to the better known difference in action between α - and β -amylases respectively on the starch molecule. As would be expected it is the endo-PG which results in a rapid reduction in the viscosity of pectin solutions.

Further complexity results from the specificity of the different PG enzymes. Some act upon the intact methylated pectinic acids, whereas others, acting only upon the pectic acid chain, require the prior removal of methoxyl groups. The latter require the concurrent presence of PE in order to depolymerize pectinic acids.

COMMERCIAL PREPARATIONS

Plant material containing pectic substances also contains PE, but in general, appears to be devoid of PG. Micro-organisms, typically yeasts

and moulds, produce PG in a substrate containing pectin, but in general have little PE activity. These facts are important in the technology of pectic enzymes.

Commercial preparations are based upon cultures of moulds, usually *Aspergillus foetidus*. As would be expected published details of production methods are meagre. Surface cultures on a suitably impregnated bran support have been described, and submerged culture has been successfully applied. Variations in the substrate influence the yield and composition of the enzymes, the presence of pectic substances encouraging the formation of PG and, possibly, PE.

Enzymes typically present in an *Aspergillus foetidus* preparation are:—

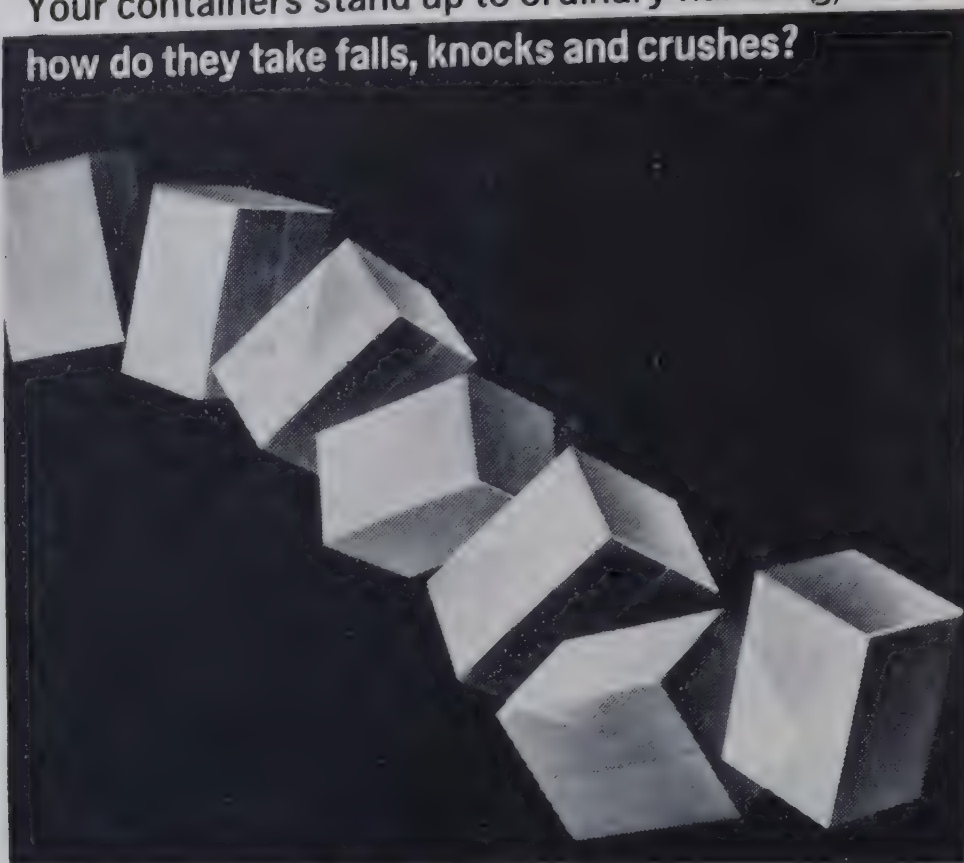
- polygalacturonases (both endo- & exo-)
- pectinesterases
- cellulase
- proteases
- α -amylase

The conditions of pH and temperature for the action of these preparations are not well defined because of the diverse nature of their components. For instance, an enzyme preparation from *Aspergillus foetidus* showed maximum action at pH 5.5 after 1 hr. and at pH 3.5 after 96 hr. This is apparently caused by molecules inaccessible at the commencement of the action, becoming accessible by the action of *e.g.* the PE of the medium. In general the enzyme preparation is required to be active in the pH range of fruit products (2.5 — 4.2) and no attempt can be made to adjust the substrate to the optimum pH of the enzymes.

The temperature at which the enzyme action proceeds will again depend on the properties of the material being treated and the time available, and not on the optimum for the enzymes. Higher temperatures (up to 145°F) are desirable to reduce microbial spoilage, but involve a risk of flavour changes.



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APPLICATIONS

The main uses of pectic enzyme preparations are in the fruit juice industry. There are two distinct applications — juice extraction and juice clarification.

JUICE EXTRACTION — Some fruit juices *e.g.* apples and citrus, contain relatively little pectin (although the fruit insolubles are rich in protopectin from which pectin can be extracted). Soft fruits however, notably blackcurrants and some varieties of grapes, have highly viscous juices. For these, treatment with pectic enzymes before pressing is essential for good juice yields. Dosage, and time and temperature of treatment depend on the raw material. For grapes 24 hr. at 115°F has been regarded as a maximum. Two hours at 130°F has been suggested for black currants.

JUICE CLARIFICATION — Clarification is a complex change resulting from reduction in viscosity and precipitation of suspended flocculent material. Usually a brilliantly clear stable juice will result only when the juice is stored. The primary action of pectic enzymes occurs in from 2-14 hrs., according to the temperature, which may vary from 60 to 120°F. Complete removal of pectin is often undesirable because of its favourable effect on the softness and body of the juice.

The makers of one commercial preparation specify the following for the clarification of apple juice:

°F	Time (hr.)
60 - 80	10 - 14
100 - 120	2 - 3

Pectic enzymes for juice clarification can sometimes be used with advantage in conjunction with gelatin to improve fining. The concurrent action of α -amylases to remove traces of soluble starch may be helpful. Commercial preparations are available containing combinations of these materials, with or without filter-aid, designed for specific applications. Sulphur dioxide may be required to reduce microbial spoilage during treatment.

It must be emphasized that, because of variations in substrate, permissible heat treatment and so on, each application should be studied as an individual case. Failure may result if the specific properties of the enzymes present do not correspond with the changes required in the raw material.

PROTEOLYTIC ENZYMES (PROTEASES)

SUBSTRATE

Polypeptides are hydrolyzed (see Fig. II). The bond broken may be at the end of the chain (exo-enzyme) or within the chain (endo-enzyme). Generally the action of proteolytic enzymes is to convert enzymes into amino acids and/or polypeptides of various chain lengths. This conversion causes a profound physical change in the material resulting in greater solubility and reduced viscosity.

Native, undenatured, proteins are hydrolyzed less readily than denatured protein, presumably because of the inaccessibility of susceptible bonds as a result of the proteins' secondary structure.

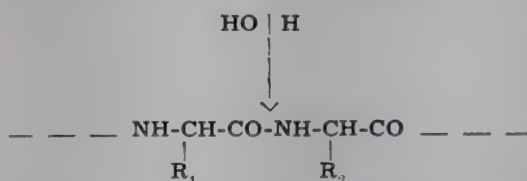


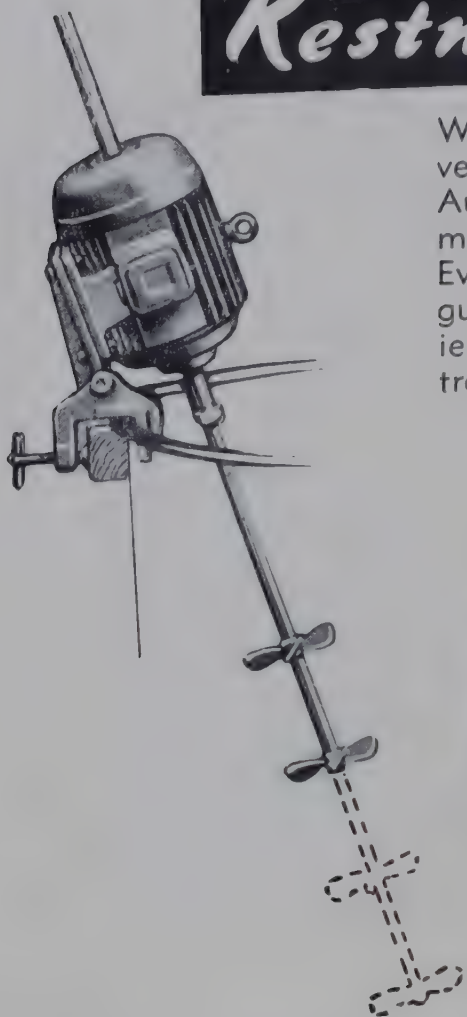
FIG. 2. Polypeptide unit, showing site of hydrolysis.

SPECIFICITY AND NOMENCLATURE

The specificity of purified individual enzymes limits their action to certain substrates. In the diagram substituents R_1 and R_2 and their positions within the polypeptide molecule are the factors which determine whether an enzyme will rupture the bond. Classification of proteolytic enzymes has proved to be exceptionally difficult and no attempt will be made to elaborate on it here. Commercial enzymes preparation always contain a mixture of enzymes so that specificity is not very apparent.

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COMMERCIAL PREPARATIONS

The main proteolytic enzymes available for technical use are:—

ent temperature ranges for optimum action. There is thus presented an opportunity for compounding

Common Name	Source	pH Optimum
<i>Animal</i>		
Pepsin	Gastric Juice	1.8 — 2.0
Rennin	Stomach (calf)	3.8
Trypsin	Pancreatic Juice	7.8
<i>Plant</i>		
Papain	Latex of the green fruit of the tropical melon, <i>Carica papaya</i> (Papaw).	7 — 7.5
Bromelin	Fruit, leaves and stem of pineapple, <i>Ananassa sativa</i>	
Ficin	Latex of <i>Ficus</i> spp.	6.5 — 9.5
<i>Microbial</i>		
Fungal	<i>Aspergillus oryzae</i>	
Bacterial	<i>Bacillus subtilis</i>	about 7

These enzymes exhibit important differences which will be described in relation to their industrial applications.

Rennin, the only animal protease finding extensive use in food manufacture is prepared as a saline extract of calves' stomachs. Modern methods of purification produce clean liquid, powdered and tableted preparations in marked contrast to the foul-smelling contaminated rennets which were employed in past years for cheese making.

Papain, bromelin and ficin are separated from the juice or latex by fractional precipitation with alcohol, acetone, etc., and other purification procedures. Microbial cultures for enzyme manufacture are grown by surface or submerged culture. The methods of extraction and purification are not disclosed.

APPLICATIONS IN THE FOOD INDUSTRY

Meat Tenderizing — The tenderness of meat, especially of the cheaper and tougher cuts, can be improved by the controlled action of proteolytic enzymes. Both the muscle proteins and the connective tissue proteins are involved. Protease extracts from various sources act preferentially on the different meat proteins, and also have differ-

ent enzymes from different sources to achieve the best effect. For success the connective tissue, collagen and elastin, should be hydrolyzed to a greater extent than the muscle proteins proper. If the latter are much affected, unpleasant mushiness results.

The following are the main characteristics of the enzyme extracts used:—

Papain:

Affects collagen and muscle proteins. The temperature range is fairly high (140° to 185°F). Papain therefore has little effect on meat held under refrigeration and is supposed to exert most of its tenderizing action during the early stages of cooking. In this it is assisted by the onset of denaturation of the meat proteins.

Bromelin:

This is said to be less effective in softening connective tissue than papain. The temperature range of 86° to 140°F is much lower so that fairly rapid action can occur while holding the meat before cooking.

Ficin:

This has similar properties to bromelin. Some objection to its use has been taken because of its effect on the skin.

The tenderizing action of bromelain and ficin is enhanced by cysteine. Commercial meat tenderizers are either based on papain or consist of a mixture of the three enzyme extracts described. Salt, monosodium glutamate and other substances are usually incorporated in the finished product.

A limitation to the use of tenderizing enzymes is imposed by the difficulty of obtaining reasonably uniform distribution throughout the thickness of the meat. Contradictory statements have been made concerning the penetration achieved by surface application. Penetration from as little as a few millilitres are recorded while others claim much deeper penetration. All agree however that surface treatment can be useful only for relatively thin cuts of meat, even if assisted by stabbing the meat with a fork or other device. The temperature range of the enzyme preparation is important. If action occurs at a fairly low temperature, there will be surface mushiness before significant softening of the interior has occurred.

Attempts to improve distribution within the meat have included injection into either the fresh carcass or joint, or into the beast itself just before slaughter. Another idea which might be successful is to reconstitute freeze-dried meat with a suitable saline enzyme solution. Papain and bromelain are both used for this purpose.

Careful control is essential in the use of injection (or pumping) methods. Treatment of the live animal is covered by patent (Swift, U.S. 2903362, 1954) where exact conditions are laid down. Papain is referred to in the patent but it appears that a mixture of papain, bromelain and ficin is now preferred. Meat prepared by this process (Proten Beef) has been fairly extensively marketed in the United States and there have been large-scale trials made in Australia. The cost, which includes royalties, makes the process economically unattractive at present.

Post mortem pumping with enzyme is also patented (C.S.I.R.O., Aust. application 59272, 1960). Exact conditions for successful exploitation of this patent are disclosed. Here again papain is mentioned. It does not appear that this procedure has been adopted commercially.

BAKED GOODS

Proteolytic enzymes of fungal and bacterial origin are used in baked goods to modify the physical properties of wheat gluten. There is extensive and successful application to the manufacture of bread, biscuits and pastry. In bread making use of proteases increases the extensibility and tolerance of the gluten and is claimed to reduce the mixing time necessary for making the dough. However, this latter claim must be viewed with some doubt owing to the very limited time which the enzyme would have to modify the gluten.

Proteases hasten the physical relaxation of doughs and pastes, so that biscuits, pastry and so on show less tendency to curl after pinning and cutting. The customary resting time can consequently be reduced or eliminated.

BREWING

Proteolytic enzymes are used by most brewers as an adjunct to chill-proofing. The object is to remove the protein responsible for chill haze of beer. The enzyme preparation, usually based on papain or bromelain, but possibly of fungal or bacterial origin, is added to the beer about 24 hours before final polishing. Satisfactory results require hydrolysis of the haze proteins to proteoses and not to amino acids. The latter have a tendency to be bitter and have other undesirable effects on the beer flavour. Proteoses on the other hand have a beneficial effect on both the flavour and the foam retention of the beer.

Excessive proteolytic action is likely to destroy the head almost entirely.

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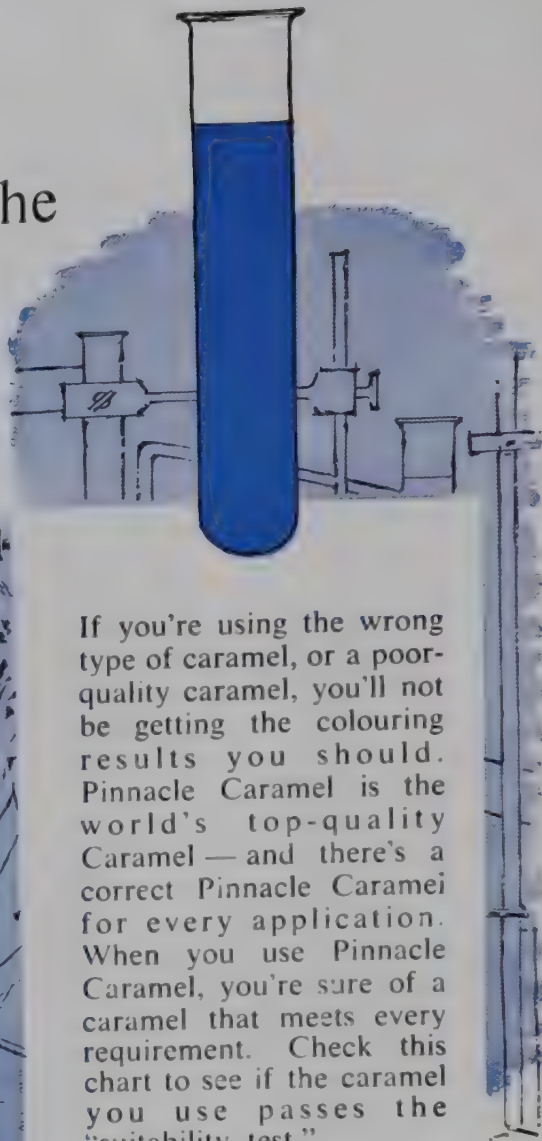
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CHECK THIS CARAMEL SUITABILITY CHART

These are the caramel requirements for various food manufacturing industries. Pinnacle Caramel passes all these tests. Does the caramel you use?

Industry	Suitability Test
Bakers and Pastrycooks	Must be quality caramel with high colouring power and uniformity.
Coffee Extract	Must have uniformity and be tolerant to the negatively charged material in the extract.
Sauce and Pickle	Must have high stability and colouring power. Generally electro-positive.
Vinegar	Must have high colouring power, stability to acids, also tannin resistance.
Meat Canning, Pudding and Cake	Must be a quality caramel with deep, rich colouring power.

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CHEESE

Rennet added to milk partially hydrolyzes the casein, removing protective groups, causing a curd to form. Other proteolytic enzymes have a similar effect, but they lack the specificity of rennet, and tend to digest the precipitated curd with undesirable results. As a consequence no satisfactory substitute for rennet in cheese making appears to have been found.

F.T.A. of W.A.

Visit to the Works of the Australian Glass Manufacturers Company: Representatives of over 20 member-firms on Tuesday, November 3, visited the works of the Australian Glass Manufacturers Company. During the course of the visit, the bottle making and embossing sections were fully operative.

Subsequently, two excellent films were shown — one dealing with glass making and the other with the operations of the Company's Sheet Glass Works at Dandenong, Victoria.

The serving of refreshments brought an interesting and informative evening to a close.

Proposed Educational Course: The Education Sub-Committee comprising Messrs. G. E. Rock (Plaimar Ltd.), R. A. Martin (Anchor Products (W.A.) Pty. Ltd.), and R. Evans (Plaistowe & Co. Ltd.) in conjunction with Dr. Collins and Mr. Snell of the Perth Technical College are currently discussing the proposed establishment of a course of lectures on the "*Fundamentals of Food Processing*".

It has been proposed that the course comprise 18-20 lectures, spread over a three-month period, at weekly intervals, each lecture session being held on a Wednesday afternoon from 3.30 p.m.-5.30 p.m.

Initially, it is proposed to restrict the Course to 30 students. Further information will be made available when plans have been finalized.

F.T.A. of S.A.

F.T.A. — I.F.T. CHRISTMAS DINNER DANCE

The Institute of Food Technologists, Southern Australia Section, and the Food Technology Association of Victoria got together to a combined Christmas function on Tuesday, 24th November, 1964, at the *Stardust*, 1 Marine Parade, St. Kilda, from 7 p.m. to midnight.

SCHOLARSHIPS

The F.T.A. of N.S.W. has forwarded £100 each to the University of New South Wales and to the Hawkesbury Agricultural College towards deferring the cost of a scholarship at each institution in food technology for the academic year of 1965.

"JOURNAL OF FOOD SCIENCE AND TECHNOLOGY"

The publication of the journal "*Food Science*" has been discontinued and its place has been taken by the "*Journal of Food Science and Technology*". "*Food Science*" had been published by the Central Food Technological Research Institute of the Indian Council of Scientific and Industrial Research, Mysore. The new journal will be the responsibility of the Association of Food Technologists, India, with headquarters at the C.F.T.R.I., Mysore.

In the first instance the new journal will be a quarterly publication.

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INDUSTRIES IN AUSTRALIA

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*Editor: F. H. REUTER,
Ph.D., F.R.I.C.
F.R.A.C.I.*

*Associate Professor of
Food Technology,
The University of
New South Wales,
Sydney.*

Committee of Management:
F. S. BRADHURST, Chairman,
S. M. ADAMS,
R. F. EAGLE,
A. R. HOBBS,
F. H. REUTER.

Office:
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BOOK REVIEWS

- **"FOOD AND ITS FUNCTION"**, by A. G. CAMERON. 208 pages. London, Edward Arnold (Publishers) Ltd., London. 1964. 12/6.

The author, A. G. Cameron, who is on the staff of the National College of Food Technology at Weybridge, Surrey, England, has written this book primarily, for students at grammar and modern secondary schools. It is written for the reader who has no background scientific knowledge and therefore easily understood explanations of biological processes are included.

The author deals with food in its various aspects commencing with a description of the body as a living machine and the part which food plays in its functioning. Next follows a discussion on the nature of nutrients and a simple account of the physiology of digestion. This is followed by three chapters which have as their titles *"Energy foods"*, *"Body-building foods"*, and *"Protective foods and water"*. Mr. Cameron describes for us the essential functions of the various nutrients of each group. He tells us where foods are grown, how they are processed and in some cases pertinent facts of historical interest.

The remainder of the book is devoted to chapters on *"Meal Planning"*, *"A Balanced diet"*, *"Cooking"*, *"Preservation of food"*, *"Food hygiene"* and finally, one in which the author suggests methods of augmenting world food supplies.

The text is easy to follow being much illustrated with numerous diagrams, drawings, photographs and maps. The reader is given a better concept of size and in some instances chemical processes by the frequent use of parallels drawn from every day life. He uses tables too, the better to illustrate his facts. At the conclusion of each chapter there is a summary and at the end of the text there is a list of

revision questions and of suggestions for further reading and an index.

Although at an elementary level the subject is covered and should prove of value to those wishing to acquire an introduction to the study of food and nutrition. However, this book is intended for readers in the United Kingdom and occasional points will require elucidation for readers in other parts of the world. For example, greater stress could be given to the relative unimportance of food sources of Vitamin D in countries where the skin is exposed to abundant sunlight. Also it is not made clear that in countries other than Britain flour is not always supplemented with thiamine to counteract losses in processing or with chalk to supply calcium.

Reviewer: Miss Janet Winn,
Dietician, The Royal Newcastle
Hospital, Newcastle, N.S.W.

- **"BIOCHEMICAL ENGINEERING"**, by F. C. WEBB, 743 pages, D. Van Nostrand Co. Ltd., London. £5.0.0. 1964.

This book has been developed from a one year post graduate course in Biochemical Engineering at University College, London, open to students who have studied either Chemical Engineering or Biochemistry for their first degree. The main emphasis of this book lies on the aspects of food processing, beverage manufacture, drug manufacture and the pharmaceutical industries, and some attempt has been made to group related general principles rather than specific trade technologies. The book covers many topics such as heat transfer, dehydration, yeasts, colloids, emulsions, etc., and it is not possible to treat every one of these topics in an exhaustive manner, the consequence being the treatment is rather sketchy. The

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book is more descriptive than analytical with the consequence that basic engineering principles are rather inadequately covered but there is a wealth of information concerning various problems that could arise in the biochemical industries. There is quite an extensive bibliography which appears to be quite up-to-date.

This book can be recommended for all technical staff engaged in biological industries and should prove of use to design teams, development staff and production managers on other related fields, who could find it a useful contribution to their understanding of biochemical problems.

The book is well produced with clear diagrams.

Reviewer: Professor R. T. Fowler, School of Chemical Engineering, The University of New South Wales, Sydney.



- "PACKAGING IN GLASS", by B. E. MOODY. 303 pages. Hutchinson & Co. (Publishers) Ltd., London. 1963. £3.3.0.

Mr. Moody is to be congratulated on his fine presentation of a unique work which cannot fail to be of interest and benefit to anyone who is concerned with or who has reason to consider glass as a packaging material. The book sets out in a readable fashion a wealth of information which has no doubt been available from text books and from glass and machinery suppliers but which has never before been collectively summarized in an impartial fashion for the benefit of the glass user.

The introductory chapter of "*How Bottles are Made*" would be of interest to any user of glass containers and serves to give basic understanding of subsequent discussion relative to the degrees of accuracy in capacity and dimensional attributes for a glass container which can be attained in its manufacture. Recommended methods for checking dimensions and capacity are outlined as are methods of testing physical

properties of containers discussed in another chapter. Mechanical strength and thermal shock resistance are treated at some length with accent on design features of a container related to various properties, and optical and chemical properties of common container glasses are included in this section.

Two chapters on "*Choosing the Type of Pack*" and designing a glass container are worthy of reference by any Marketing Executive and contain check lists useful to sales or purchasing personnel and package designers alike.

The basic principles of planning and operation of glass packaging lines are well set out and introduce a number of detailed chapters of the book each in turn dealing with the principles and types of equipment available for cleaning, filling, sealing, processing, labelling and packing of glass containers. Merits and disadvantages of various machines, some suitable for low speed semi-automatic lines and others for high speed plants are discussed in an impartial fashion. This section is particularly well illustrated with photographs and diagrams and each chapter is concluded with a list of available machinery which whilst restricted solely to suppliers in the U.K. is nevertheless useful and informative.

Packaging Problems and steps which can be taken to avoid them is treated in a summary check list form and is followed by a very interesting lesson in the principles of bottle fracture diagnosis.

The concluding chapters consider the history of glass containers and take a look at present and future trends in design and technology.

As a pure reference volume alone this book is worthy of a place in the library of any firm utilizing glass as a packaging material and it will be of value to the glass industry as a whole in assisting the training of personnel in this rather specific field of packaging technology.

Reviewer: G. H. Robson, A.C.I. Ltd., Sydney.



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CONFERENCE ON FRUIT AND VEGETABLE STORAGE RESEARCH

The Fourth Australian Fruit and Vegetable Research Conference was held at East Ballina, N.S.W., in June, 1964. Held under the auspices of the Australian Agricultural Council and the Committee for Co-ordination of Fruit and Vegetable Storage Research, and organized jointly by the C.S.I.R.O. Division of Food Preservation and the N.S.W. Department of Agriculture, the conference was a notable example of the close co-operation which exists in this field of research between C.S.I.R.O. and the State Departments of Agriculture and, in this case, the Fruit Research Division of the New Zealand Department of Scientific and Industrial Research.

The conference usually meets at intervals of four years, and this time was a residential one held at the Shaw's Bay Hotel, East Ballina, New South Wales, from June 8th to 12th. There were 32 full-time delegates, and other delegates from N.S.W. and Queensland attended some sessions. The conference was officially opened by the Director General of the Department of Agriculture in New South Wales, the host State.

Sessions were devoted to presentation and discussion of papers on fruit and vegetable physiology and storage technology, and to lectures on closely related topics. Conference members took the opportunity to observe work being done at the Tropical Fruit Research Station of the N.S.W. Department of Agriculture at Alstonville, and to study developments in the banana industry in northern New South Wales.

Considerable attention was given at the conference to the bruising of fruit during transport and storage (a subject of vital importance to the Australian apple industry), and to storage disorders in apples. Other

fruits on which there was much discussion were bananas and citrus fruit, on both of which much research is currently being carried out.

Contributions given were:—

"Senescence inhibitors for fruits and vegetables", by Dr. K. S. Rowan, Botany Department, University of Melbourne.

"The bruising of fruit during transport and storage", by J. B. O'Loughlin, Horticultural Division, Tasmanian Department of Agriculture, Hobart.

"The quality of fruit and vegetables at the retail level", by B. Owen French, Division of Horticulture, N.S.W. Department of Agriculture, Sydney.

"Progress in research on Bitter Pit in apples", by F. M. Melville, Horticultural Division, Western Australian Department of Agriculture, Perth.

"Recent work on breakdown in apples", by K. J. Scott, Division of Horticulture, N.S.W. Department of Agriculture, Sydney.

"Latent infections in relation to the storage and ripening of fruit", by J. H. Simmonds, Plant Pathology Branch, Queensland Department of Primary Industry, Brisbane.

"The physiology of bananas in relation to storage and transport", by J. R. Blake, Food Preservation Research Branch, Queensland Department of Primary Industries, Hamilton.

"The effects of small temperature variations in fruit storage", by G. B. Tindale, Scoresby Horticultural Research Station, Victorian Department of Agriculture.

"Review of research on fruit and vegetable storage and post-harvest physiology in Australia since 1945", by Dr. S. A. Trout, Food Preservation Research Branch, Department of Primary Industries, Brisbane.

"Changing recommendations for the control of coreflush and for scald on Sturmer apples", by C. A. S. Padfield, Fruit Research Division, Auckland, N.Z. (delivered by Mr. G. Strachan).

The following contributions were made to the conference by the staff of the C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W.:—

"The characteristics required in citrus fruit and apples for processing", by J. F. Kefford.

"The precooling of fruit and vegetables for storage and transport", by E. G. Hall.

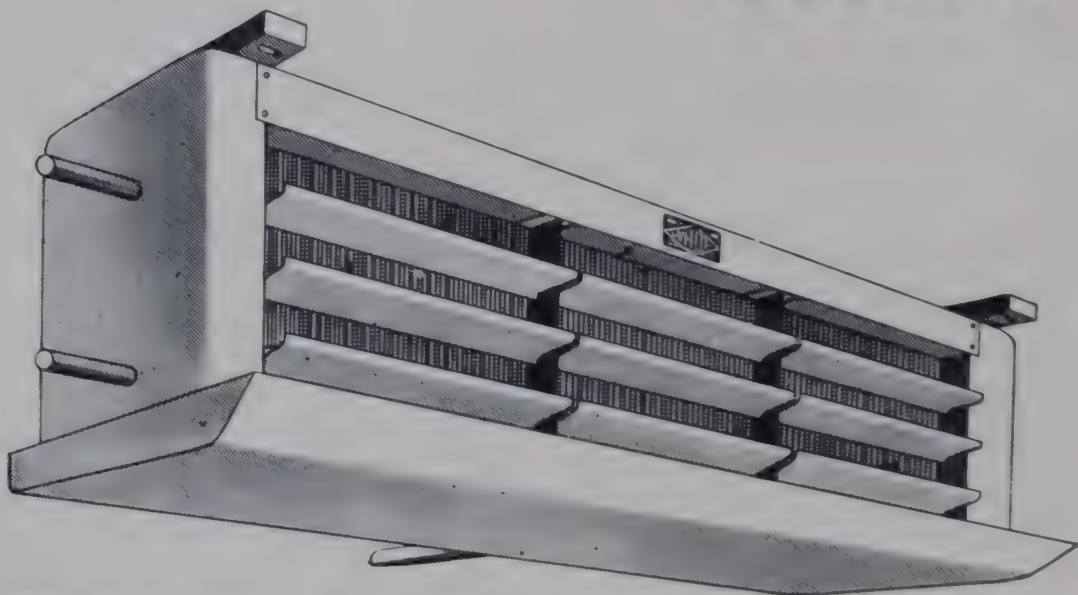
"Determination and control of temperature and humidity", by J. Middlehurst.

"Post-harvest non-parasitic disorders of oranges", by E. G. Hall.

"The physiology and biochemistry of fruit and vegetable maturation", by Dr. W. B. McGlasson.



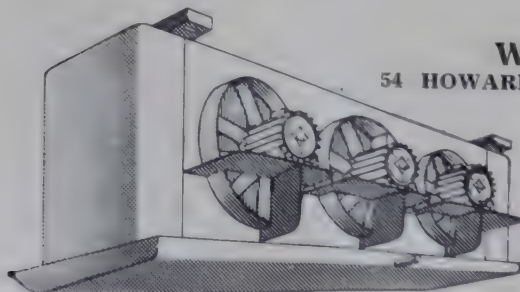
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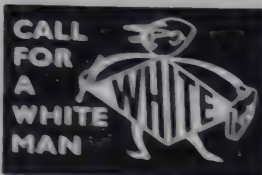


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Queensland Food Processing Advisory Committee

The Queensland Department of Primary Industries in association with Queensland food industry representatives has recently formed a *Queensland Food Processing Advisory Committee*, to ensure closer liaison between the Food Technology Section of the Food Preservation Research Branch and food processors, particularly with regard to Government aided research.

At present the Committee will deal with fruit and vegetable prod-



ucts but may have to be enlarged at a later date in order to embrace certain other processed foods.

The members of the Committee are as follows:—

Department of Primary Industries

Dr. L. G. Miles, Director, Division of Plant Industry (Chairman); Dr. S. A. Trout, Director, Food Preservation Research Branch; J. H. Smith, Director, Horticulture Branch; R. E. Leverington, Special Food Technologist, Food Preservation Research Branch (Secretary).

Food Processors Representatives

J. F. S. Brown, Managing Director, Golden Circle Cannery and a technical representative; J. W. D. McNeilly, Managing Director, J. Hargreaves & Sons Pty. Ltd. (Gordon Edgell Pty. Ltd.) and a technical representative; R. I. Duthie, Manager, Victoria Cross Manufacturing Co.; J. G. Duthie, Manager, Queensland Canneries Pty. Ltd.; The President of the Queensland Food Tech-

nology Association; The Technical Secretary of the Qld. Food Technology Association.

Those members of the Association not directly represented on the Committee have representation through the Food Technology Association.

At the first meeting of the Committee held on 22nd September, 1964 it was agreed that the Meeting would be held twice a year and the terms of reference would be as follows:—

To provide effective liaison between scientific personnel and commercial processors;

To discuss food technology problems requiring scientific research and where they might best be undertaken;

To advise in broad terms the scope of the investigations that might be undertaken;

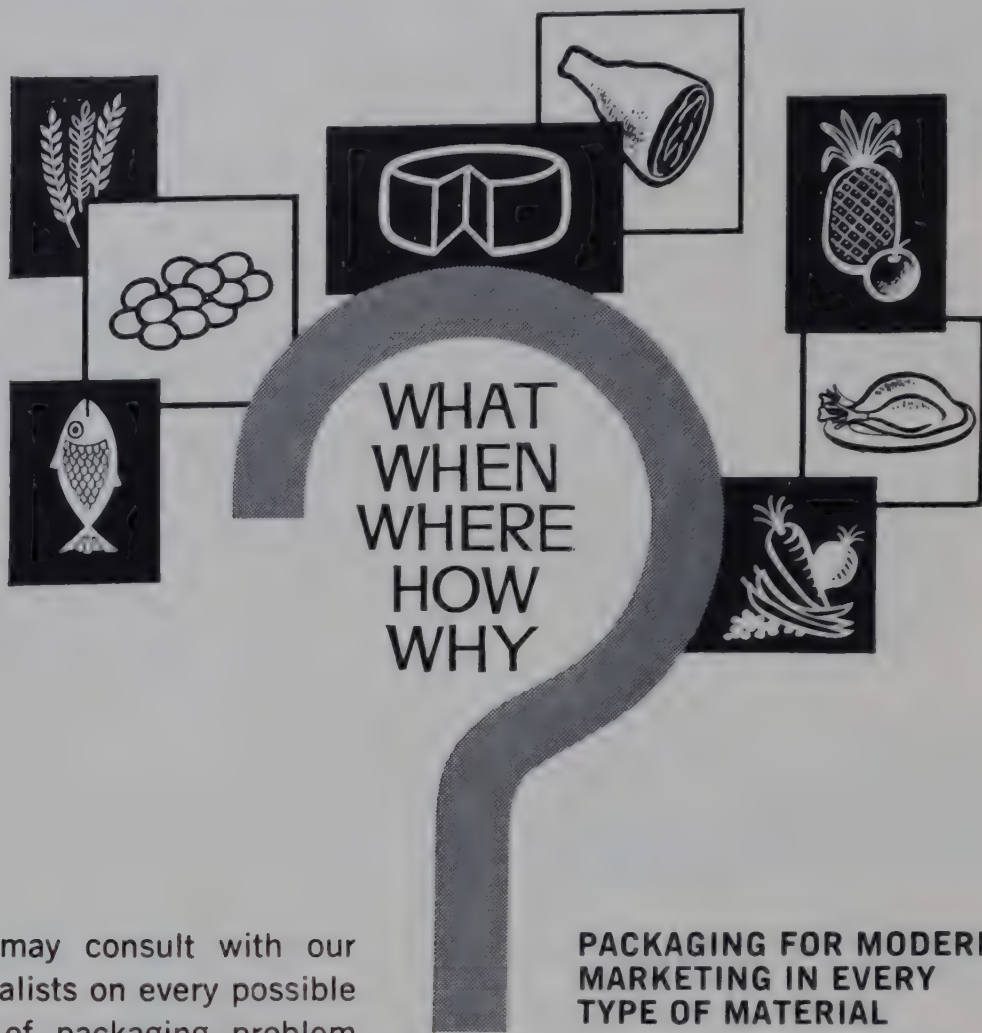
To discuss requests to the Food Preservation Research Branch for research on various aspects of food processing;

To discuss ways and means of supplying additional equipment, facilities and materials as required for recommended research.

To assess relative importance and priority ratings for proposed research and development projects.

To receive progress reports.

In addition, current research projects of the Food Preservation Research Branch were discussed and arrangements were made for all Annual and Quarterly Reports of the Food Technology Section of the Food Preservation Research Branch to be circulated to all members of the Committee and all members of the Food Technology Association of Queensland.



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The participation of the Food Technology Association of Queensland in an Advisory Committee of a research nature is probably unique in Australia and provides members with a service which should be of considerable benefit to the food industry of this State.

The Food Preservation Research Branch was established in 1960 by the Queensland Department of Agriculture and Stock (now known as the Department of Primary Industries), to conduct research in various aspects of the storage and transport and the processing of fruits and vegetables. The Laboratory is staffed by over 30 officers.

THE CANADIAN PILOT SCALE POTATO IRRADIATION PROGRAMME

A potato irradiation programme using a Mobile Cobalt-60 Irradiator was carried out in four provinces of Eastern Canada during the 1961-62 season. A total of approximately 400 tons of potatoes were irradiated over a four months' period extending from October to February. Regular observations on both control and irradiated potatoes were conducted during storage by the Fruit and Vegetable Division of the Canada Department of Agriculture until final shipment to consumer markets or processing plants. The dose of 8,000 rad used in the programme provided excellent control of sprouting in all storages regardless of variety, storage temperature, date of irradiation, method of storage or length of storage.

When good material suitable for long term storage was irradiated and not mishandled during treatment, there was no effect on the rate of breakdown during storage. Irradiated potatoes were successfully processed into potato chips, instant mashed potato flakes, frozen french fries and pre-peeled fresh boilers. Irradiated potatoes were sold to Canadian consumers in the form of table stock and processed products. No complaints of any kind

were received or reported regarding the acceptability of the irradiated potatoes. There was no unfavourable public reaction to the first irradiated food offered for sale in Canada. The results of the potato irradiation programme have created a favourable climate for the future of potato irradiation in Canada. The operation of full scale irradiation facilities is envisaged within the next two years.

DEFROZEN MEAT: ARGENTINE BAN

The Argentine National Meat Board has prohibited the sale of *tempered* meat to Britain. This was stated to be frozen meat which is partially defrozen during the period of transportation.

The ban has been made because of the poorer quality and lower commercial value of meat processed in this way, and the threat to the reputation of chilled beef which it resembles in appearance.

ANALYTICAL CHEMISTRY GROUP

A new Analytical Chemistry Group of The Royal Australian Chemical Institute was recently formed in Sydney.

The new group will promote the interests and activities of analytical chemistry; analytical chemists and those interested in the broad field of chemical instrumentation.

Membership of the Group will be open to corporate members of the R.A.C.I. and corporate members of allied professional institutes without payment of a fee. Non-members of the R.A.C.I. may also join local groups under conditions yet to be determined. In the interim, all interested persons will be welcome to attend meetings.

It is proposed to hold approximately six meetings a year on the first Monday of selected months.

BOOKS, PAMPHLETS, etc.

"RECOMMENDATIONS FOR THE PROCESSING AND HANDLING OF FROZEN FOODS"

Prepared by the International Institute of Refrigeration (Institut International du Froid). 120 pages. Paris, 1963. 21/- or \$3.00.

In publishing the first edition of "Recommendations", which is the result of the combined and individual efforts of many prominent international authorities, the International Institute of Refrigeration has placed at the disposal of both national and international organizations an indispensable guide which should prove to be highly advantageous to both the refrigeration and frozen food industries.

The quality of frozen foods is not only dependent on the selection of raw materials and their handling prior to and during freezing, but also on the condition of handling, storage and distribution. These factors are all covered in detail. The definitions and recommendations in this document will help to serve as a basis for the legal, administrative and technical considerations in a great many countries, not only in providing a yardstick for quality standards in those countries that do not have their own standards, but also as complementary regulations to existing ones in providing an international viewpoint.

The book is broken down into four parts: the Preface, which sets forth the purpose and aim of the present recommendations of the International Institute of Refrigeration, and contains a list of the group who aided in the compilation of the recommendations; General principles for the freezing and cold storage of foodstuffs, containing data on scientific background, definitions and product temperature measurement; Recommendations for the handling of frozen foods, dealing with raw material and its

preparation, cooling and freezing, distribution of frozen foods and remarks on thawing; and a series of added heat diagrams.

Although technical in nature, the material is presented in easy to read form, in both English and French, and its clarity is aided by many charts and line drawings throughout the volume.

"ENZYME CHEMISTRY OF PHENOLIC COMPOUNDS"

Proceedings of the Plant Phenolics Group Symposium, Liverpool, April, 1962. By J. B. Pridham (Ed.). 138 pages. Pergamon Press, Oxford, 1963. £2.10.0.

The topics dealt with in the thirteen papers survey the present position regarding mainly the oxidative and hydrolytic enzymatic reactions involving phenolic compounds, especially those occurring in plants and fungi. The authors are mainly British and have made contributions to present knowledge of the topics they discuss. The papers are fairly short and concise giving documented accounts of limited topics which should be of value to chemists, biochemists and botanists about to embark on research in this field. Following an introductory survey the isolation, specificity and other properties of enzymes concerned in the oxidation and the hydroxylation of phenols are discussed. Some attention is also given to hydrolytic enzymes, and to the important problem of enzyme inhibition. Enzymatic reduction of humic acids is treated briefly and a final chapter deals with some new enzymatic reactions of phenols.

"COLOUR"

A guide to basic facts and concepts by R. W. Burnham. 249 pages. John Wiley, New York, 1963.

"ENZYMES"

By M. Dixon and E. C. Webb, 2nd edition. 970 pages. Longmans Green Ltd., London, 1964. £4.10.0.

The authors, who are, respectively, Reader in Enzyme Biochemistry, Cambridge University and Professor of Biochemistry, Queensland University, Australia, intend this as a reference tool for research workers needing an elucidation of the principles of enzymology.

Since its first publication six years ago, the number of recognized enzymes has increased by more than 170, there have been many other advances, and the Report of the Commission on Enzymes of the International Union of Biochemistry has brought order to the nomenclature. Much new work is, therefore, introduced into this edition, including the table of enzymes, now revised to the middle of 1962, each entry giving the Commission's number. The opening chapters are on techniques used in the study of enzymes and of enzyme action and on special methods used in the isolation of enzymes; the authors deal at some length with kinetics, then proceed to classification with reference to the Commission's Report, discuss specificity, mechanisms, inhibitors, cofactors, structure, formation and enzyme systems, and conclude with a review of biological aspects.

The appendix includes an *atlas* of crystalline enzymes, which gives microphotographs of those for which illustrations have been published. The bibliography contains 2,972 references.

GLUTEN FREE CAKE

Recipes for coeliacs for gluten free cake and scone mixes using butter powder have been developed by Mr. R. A. Buchanan of the C.S.I.R.O. Division of Food Research and published in the Journal of the Dietetic Association of Victoria (14, 11, 1963).

"THE BIOGRAPHY OF AN INDUSTRY — THE HISTORY OF FROZEN FOODS, 1938-1963"

As a special feature in their 25th anniversary number, the journal "*Quick Frozen Foods*" have published what is claimed to be, and which probably is, the most complete and authoritative review yet published of frozen food progress over the past 25 years.

In the 164 pages of the review all the principal events both commercial and technical which produced the industry as it is today, are related, interwoven understandably with the history of the journal itself.

"CORN PRODUCTS — CRITICAL DATA TABLES"

A reference manual of data concerning products manufactured by corn refiners is now available to the public at a cost of \$4 per copy from Corn Industries Research Foundation, Inc., Washington, D.C. Called "*Critical Data Tables*", the 452-page volume was just reprinted with minor changes from the 1957 second edition.

Contents of the Foundation publication include the physical and chemical properties of corn syrups and sugars, dextrose and sucrose, starch and dextrin, vegetable oils, and feed and grain. Also included are humidity and water property tables, correction factors and conversion tables.

"FREEZE DRYING"

U.S. Department of Agriculture, Economic Research Service, Marketing Economics Division, Market Structure and Costs Branch, Washington, D.C. 1963.

F-D Report No. 1. Freeze-drying: progress and problems.

F-D Report No. 2. Freeze-drying expectations.

F-D Report No. 3. Freeze-dried poultry?

F-D Report No. 4. Freeze drying; food processors, equipment firms, and others.

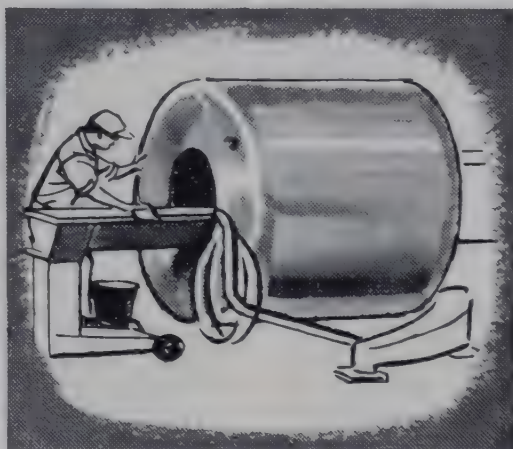
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ADDITIVES

Fumaric Acid's Future

Because the F.D.A. in May, 1963, recognized fumaric acid as generally safe for foods at levels required to accomplish its intended effect and because Standard Brand's patent (U.S. Pat. 2,412,305) covering the use of fumaric acid in edible gelatin foods expired in December, 1963, the switch to fumaric acid by American food manufacturers is to be expected reports *"Food Manufacture"* (June, 1964). In addition to gelatin, fumaric acid is being used in leavening systems, sour rye bread, wine, fruit juice drinks, pie fillings, jelling aids, maraschino cherries, jellies, jams and acidic candies.

The total U.S. food and beverage market for acidulents is about 60 million lb per year. Of this, about 45 million lb are citric acid; fumaric acid totalled in the past about 3.5 million lb, and adipic, tartaric, lactic, and malic totalled 11.5 million lb.

About 2 lb of fumaric acid will give the same degree of flavour as 3 lb of citric or adipic acid. This represents a great saving for fumaric acid users.

Pesticide Residues in Food in Relation to Human Health

Data bearing on the toxic hazard due to pesticide residues are available from studies in which the amount of residue present in various foods has been determined and from animal toxicity experiments, and may be available from use experience, human volunteer studies, and cases of poisoning due to accident or suicide attempt. Studies are more nearly complete for D.D.T. than for any other pesticidal chemical. Results from each of these types of study seem to indicate that no significant hazard to human health

exists from pesticide residues as they now occur in the diet of people in the U.S.A. No known cases of illness in the United States have resulted from insecticide residues on food when formulations have been used according to directions. The same is true in the United Kingdom. However, there have been several instances in which insecticides used quite improperly on foods have led to acute poisoning soon after ingestion. Contamination of foodstuffs with pesticides can also occur during shipment or storage. While a number of the common pesticides, including D.D.T., are stored in the body, this storage is not indefinitely cumulative. With tolerated doses of D.D.T., man approaches storage equilibrium in about one year and does not store any more of the compound regardless of how long the dosage is continued at the same rate. 203 references. (Part of author's summary.)

W. F. Durham, *"Residue Reviews"*, 4, 33-81 (1963).

Tasty Evaporated Milk Overcomes Gelling Problem

Chemists of the Agricultural Research Service of the U.S. Department of Agriculture have developed a new process for manufacturing evaporated milk that dilutes to a high-quality, fresh-flavoured beverage. The new product is claimed to taste much better than ordinary evaporated milk and it more nearly resembles fresh milk in flavour and colour. It can be made at a concentration of either two or three times that of whole milk.

The process utilizes H.T.S.T. sterilization. A test marketing of commercially produced milk concentrate, stabilized with polyphosphates, is under way at the University of Wisconsin.

Chemists in the Dairy Products Laboratory of the U.S.D.A. made evaporated milk by the H.T.S.T. process many years ago, but they did not recommend the process because

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of the milk's tendency to gel in storage. Now they have found a way to overcome this gelling by adding polyphosphates to the milk before it is sterilized. Extensive evaluation of these anti-gelling agents has provided convincing evidence that they are effective and commercially feasible for use. The polyphosphates are a chemical food additive; thus, their use in evaporated milk will have to be approved by the Food and Drug Administration.



Review of Food Additives and Contaminants

As part of the systematic review which is being undertaken of the use of food additives and contaminants, the Food Additives and Contaminants Sub-Committee of the British Food Standards Committee have been asked to examine the question of the leaching of chemicals from food containers, packaging materials and printing inks to food. It is intended to exclude from the scope of this review contamination arising from the erosion of the interior surfaces of metal cans but to include the leaching of any chemicals from can linings where such linings are not of elementary metal.

The Sub-Committee would welcome the co-operation of the trade, enforcing authorities and other interested bodies in their review. In particular they wish to obtain complete information as to the substances, both natural and synthetic, at present in use in packaging materials; their chemical composition, properties and any relevant toxicological information; evidence on leaching with full details of the composition of the materials furnishing the migrant, the conditions under which leaching occurs and the magnitude of the transfer. The Sub-Committee would also like to have similar information about any new substances being developed for packaging materials and to know of any advantages which these may have over present substances.

INTERNATIONAL DAIRY CONGRESS IN AUSTRALIA

The Executive of the International Dairy Federation has provisionally accepted the invitation of the Australian National Dairy Committee to hold the 18th International Dairy Congress in Australia in 1970.

International Dairy Congresses are held every four years and are initiated by the International Dairy Federation, an organization continuously engaged in solving problems of common interest to world dairying.

A Congress brings together from some 60 nations the leading minds in all sections of the dairying industry. Overall duration of a Congress is 14 days; half of this time is spent dealing with reports, lectures and discussions by world authorities in various fields and the remaining time is spent on study tours to dairy production centres throughout the host country.

The venue for the Congress has not yet been decided but it is likely to be in the Sydney Opera House because of its seating capacity, offices and facilities for simultaneous translation which it will have to offer.

The sessional meetings of a Congress deal with the technological and marketing problems associated with milk, butter, cheese, condensed milk and milk powder, ice cream, quality control and analysis and dairy machinery.

Associated with an International Dairy Congress are exhibitions of the latest processing and farm equipment and social functions designed to bring the 2,000 delegates who attend into closer personal contact with their counterparts in other countries.

The cost of holding the Congress will be in the vicinity of £200,000; this will cover the expenditure involved in administrative machinery, printing, hospitality, trade exhibitions, tours and so on.

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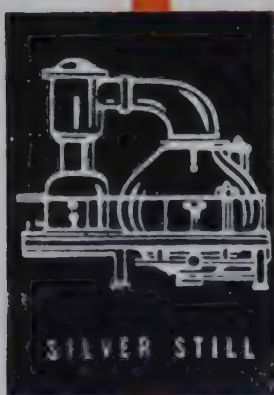
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THE SOFT DRINK INDUSTRY

Since pre-war days, the Australian thirst for soft drink has grown much faster than the thirst for beer.

In 1938-39, Australians drank an average of 3.56 gallons of carbonated beverages and concentrated cordials.

By 1963-64, the average had risen to 8.93 gallons, an increase of about 150 per cent.

In the same period, beer consumption per head rose from 11.7 gallons to about 24 gallons, an increase of a little more than 100 per cent.

After Americans, Australian are the second largest consumers of soft drinks in the world, drinking an average of 167 eight-ounce bottles of carbonated beverages each year.

But Australians still have a job ahead of them to catch up with the average American who last year drank 232 bottles.

In 1963/64 more than 400 companies produced a record 98,613,000 gallons of carbonated beverages and concentrated cordials.

In addition, the companies produced more than seven million gallons of natural fruit juices.

This torrent of liquid refreshment began as a trickle 150 years ago this year.

In 1814 Benjamin Hall started Australia's first soft drink factory, a small spruce and ginger beer plant in Chapel Row, now Castlereagh St., Sydney.

Only a year before, the colony's first bottle-blowing shop had been established at Pyrmont, Sydney.

PLANT

Another Australian pioneer of soft drinks was J. W. Driver, who in an effort to "*modify the great and lamentable evil of strong drink in Sydney Town*", opened a cordial factory in Pitt St., Sydney, in the 1820s.

In 1838, William Starkey opened in Sydney another soft drink factory, specializing in ginger beer which, within a few years, grew into the largest in the Southern Hemisphere.

The industry came of age in the middle of last century with a furious burst of activity after gold was discovered at Ballarat in Victoria.

Two partners, Rowland and Lewis set up a *tent factory* on the shore of Lake Wendourie and 13 other manufacturers quickly threw up plants to capture their share of the miners' thirst.

From these beginnings, soft drinks have grown into a £26 million industry paying wages and salaries of about £4.5 million a year to about 5500 people working in more than 550 modern factories across the nation.

The value of land, buildings, machinery and plant is nearly £15 million.

TRAINING

Over recent years nearly £6 million has been spent on plant and machinery.

In 1957, the industry introduced a course leading to a diploma in soft drink manufacture.

Each year the Australian Council of Soft Drink Manufacturers conducts examinations in industrial microbiology, preservatives, carbonation, plant maintenance, sanitation, water treatment and health regulations.

Candidates for the diploma must submit evidence of satisfactory practical training.

The diploma is recognized throughout the world and the 12 people who sat for the final examinations in 1963-64 included men from New Zealand, Ceylon and India.

Each year the industry uses more than £1.5 million worth of fruit products. In 1963-64 it used 1,726,000 gallons of citrus juice worth £850,000.

It uses each year more than 50,000 tons of sugar, about eight per cent of all sugar used in Australia for domestic and manufacturing purposes.

Manufacturers see the great increase in their sales as evidence that the Australian public has accepted soft drink as part of their diet.

From "**The Australian**". Permission to reprint is gratefully acknowledged.

Space Age Flavours

Everytime we go to the library we come back more convinced than ever that the Flavour Industry is moving so fast it becomes difficult to visualise what it will be like in a decade. Information is pouring out of instruments at a fantastic rate. This is the era of the instrumental chemist and we feel fortunate to have been on the ground floor in the use of these new scientific aids. But we have not lost sight of the need for artistry, important as ever, in modern space age flavour development.

So that in compounding a Spice Seasoning, we extract all the flavour goodness from crude spices, quality control it and create the taste that will help enhance your food product.

Or maybe you will want a new and exciting flavour for Meats or Ice-Cream, or perhaps a subtle lift to a Pie or Biscuit. Perhaps your problem concerns the development of a new flavour "twist" for a cake mix or cordial. You may want any of these in emulsion, in powder, in essence, or "locked in" flavour forms. They are all readily available.

Why not take advantage of these skills to allow us to create a flavour for your exact needs?

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monwealth Department of Health for consideration by F.S.C. The following drafts are ready and just being prepared to go forward to the next meeting of F.S.C. early in the year:—

Tomato Products,
Miscellaneous non-excisable Beverages,
Frozen Food Code,
Dessert Pudding and Custard Mix.

In the case of *Essences and Flavours*, F.S.C. cannot proceed until the Food Additives Committee has dealt with it, and it is there that C.A.F.T.A.'s draft will be considered in the first place.

Before submitting a C.A.F.T.A. Draft to F.S.C., the Commonwealth Department of Health sends it to State Government Analysts for *officers' comments*. These are made available to F.S.C. when it is having its first look at the draft.

This is a very important link in the chain of events, because these comments are given by these men as their personal opinion. They distinctly do not reflect Departmental attitude therefore do not call for formal consultation within the Departments, and do not involve policy.

It should be noted that this is the first stage at which drafts produced by industry are scrutinized by public health officers. It speaks highly for C.A.F.T.A. drafts that they have always stood this test: none has ever required changes of any real consequence as the result of comments at this stage. This is eloquent proof of the quality of T.S.C.'s workmanship in the drawing up of its drafts.

T.S.C. then considers the C.A.F.T.A. draft together with officers' comments. This may lead to changes and modifications of the draft, which may or may not call for further consultation with industry.

The following drafts are currently awaiting comment from industry through C.A.F.T.A.:—

Cream and Cream Products,
Labelling,
Yoghurt.

C.A.F.T.A. again uses Uniform Procedure to deal with matters at this stage, if returned.

This is a very significant step in the procedure because it assures industry that F.S.C. will not modify a draft without industry being fully aware of it, and having a say in it. Nor will F.S.C. proceed with an item until it has been re-submitted by C.A.F.T.A. It rests with C.A.F.T.A.'s representatives on F.S.C. to agree to a change or call for referral back to industry.

With every draft regulation then comes the time when F.S.C. has completed its work with it. It then is sent to all State Health Departments for comment from them and particularly their FOOD Advisory Committees. What actually is called for at this stage is a declaration that the draft would be acceptable to them for adoption, and if not, what changes they would require. At this stage they are therefore asked to commit themselves in advance, as far as they ever can do this. Their replies often lead to improvements in drafting, but at times also raise substantial objections with which F.S.C. must deal in the usual manner.

The following items are currently at this stage:—

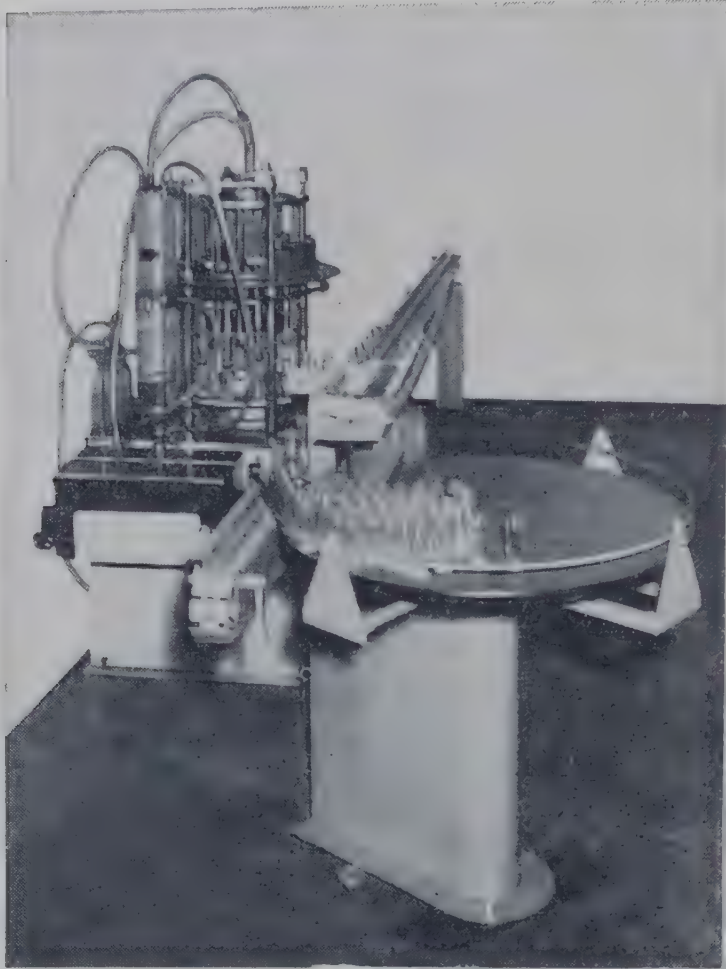
Spices, Mixed Spices, Condiments
amendment re free-running agents
in Salt,
Butter and Butter Products,
Dried Milks.

F.S.C. considers these comments at its next meeting and usually then is able to produce its final draft, though again C.A.F.T.A. representa-

— Continued on page 47

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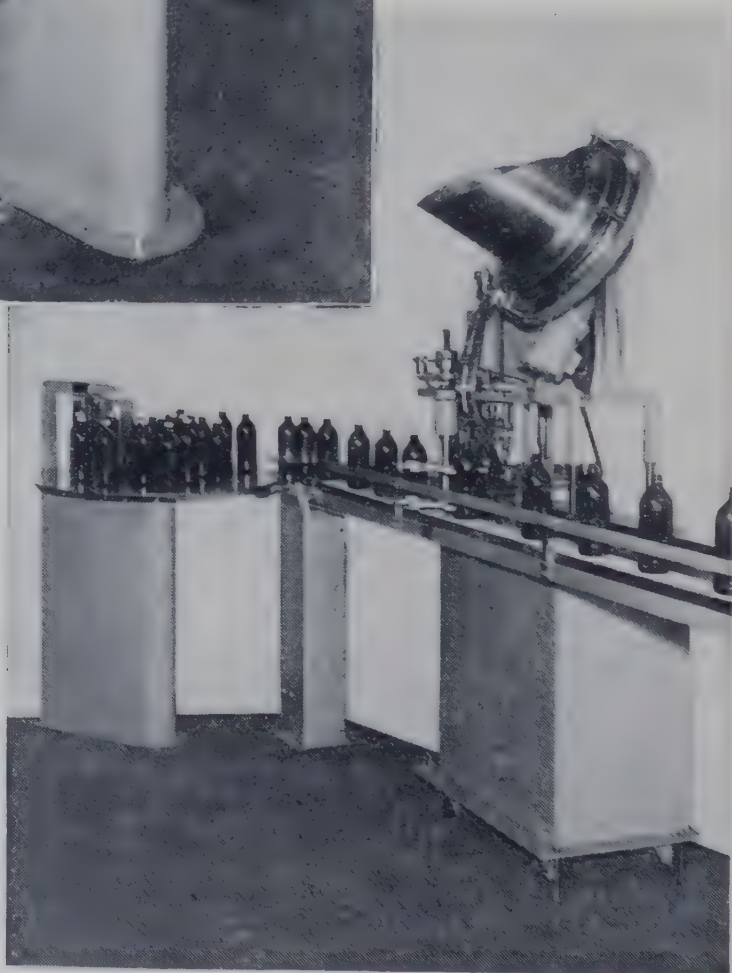
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tives can call for referral back to industry.

F.S.C.'s Final Draft then goes to the Public Health Committee of the National Health and Medical Research Council (N.H. & M.R.C.) which only in one or two instances has exercised its power of veto and referred a matter back to F.S.C. The P.H.C. approved draft goes to N.H. & M.R.C. a few days later which up to the present has always endorsed these drafts. They then are included in the N.H. & M.R.C. Report of the Session which is published a few months later after having received the approval of the Commonwealth Minister of Health. It is from these published Reports that this Journal takes its information for publication on N.H. & M.R.C. decision (see p. 9).

The Commonwealth Health Department however does not wait for publication of N.H. & M.R.C. approved drafts, but sends them to States for favour of adoption as soon as the Federal Minister has approved of the Report.

In the States which operate with a Food Advisory Committee, the Final Draft is submitted for formal approval. In the others it is the Department's sole responsibility to approve. It is a very rare case that things go wrong at this stage.

Then the State Ministers of Health has to approve and gazettal follows after the parliamentary draftsman has given it his attention.

In recent years, a growing number of requests for new regulations or amendments to existing ones have been directed to F.S.C. The committee, however, has no drafting machinery of its own nor has the Commonwealth Department of Health which provides secretarial services. Such matters are therefore always referred to C.A.F.T.A. for favour of drafting and re-submission to F.S.C. There have also been cases that fully drafted regula-

tions were submitted to F.S.C. by other bodies. These go in the first instance to C.A.F.T.A. for comment for which it employs its Uniform Procedure.

At the present time the following items under this heading are with C.A.F.T.A.:—

Spirits,
Bread,
Coffee, amendment re soluble coffee,
Honey, amendment re sucrose limit,
Ice Cream, amendment re depiction of fruit,
Meat and Meat Products, amendment re Meat Balls, Hamburger, Rissoles,
Meat and Meat Products, amendment re Meat Paste,
Pasteurization of Egg Pulp.

Not always can F.S.C. proceed with requests in this manner and it then refers them for advice to other bodies, e.g. a specialist committee.

The following are at present in this state of evolution:—

Vitamins and Minerals, amendment re cyanocobalamin and re invalid foods,
Smoke essence,
Toys in Food Packages,
Frozen Foods (proposed regulations).

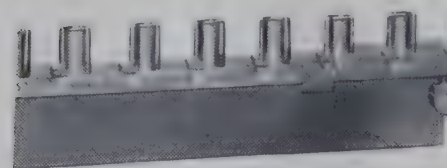
Readers will notice that Frozen Foods are now receiving attention in two ways. (See p. 11). The N.H. & M.R.C. has set up a sub-committee "*to draw up a practical code for the handling of frozen foods and report to the Food Standards Committee*". This is made up of two officers of State Health Departments, two representatives of industry, a member of C.S.I.R.O. and an official of the Commonwealth Department of Health as chairman. C.A.F.T.A. on the other hand, too, has a draft in the pipe line.

This is a most undesirable situation, and the sooner the two drafting processes be fused the better.

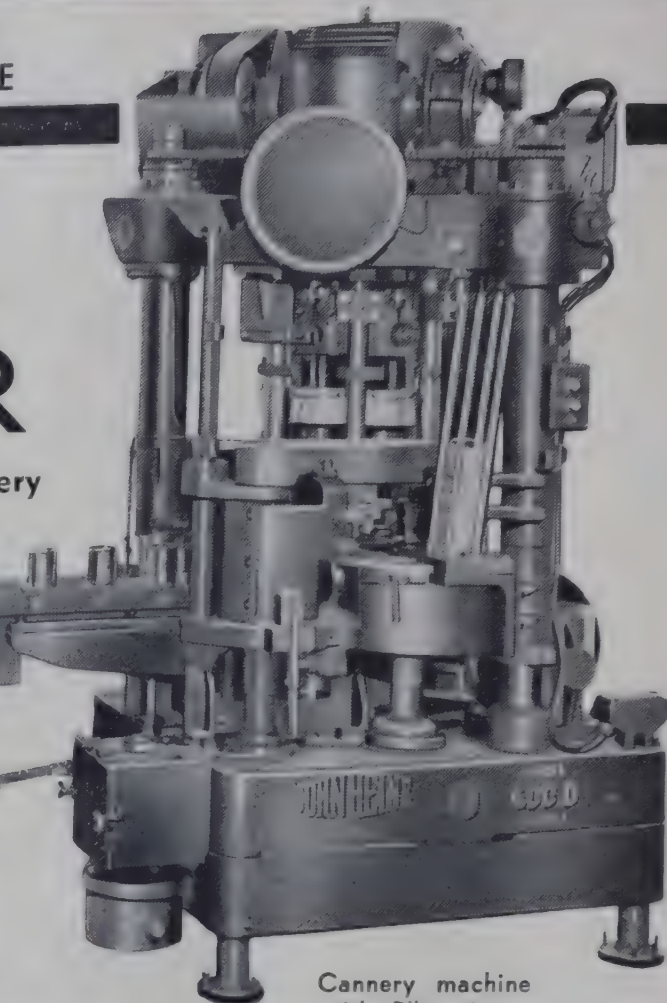
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AUSTRALIAN PRODUCTION STATISTICS

PRODUCTION SUMMARY: MARGARINE AND OTHER EDIBLE PROCESSED FATS

Single Oils and Fats, not emulsified.
Unit: Tons

Period		Single Oils and Fats, not emulsified			
		Refined, deodorized oils and fats			Refined, hydrogenated deodorized oils and fats
Year		Coconut	Peanut	Tallow	Other (a)
1963-64		1,498	3,306	3,937	2,554
					4,846

(a) Includes palm oil

The information set out has been compiled from returns of establishments engaged in manufacture of margarine and other edible oils and fats, and indicates current production trends. The figures represent quantities packed for sale (including bulk delivery).

Commonwealth Bureau of Census and Statistics

Canberra, A.C.T.

FOOD STANDARDS APPROVED BY NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL AS AT 31st MAY, 1964

STATUS OF ADOPTION, ETC., BY THE STATES, NOVEMBER, 1964

	N.S.W.	Vic.	Q'land	S.A.	Tas.	W.A.
Antioxidants	G	M	G	G	G	M
Artificial Sweetening Substances ...	M	G	G	M	G	G
Baking Compounds	G	G	G	G	G	G
Bread, Pastry and Cakes (Sodium Diacetate)	A	M	G	G	G	G
Canned Fish Products	G	G	G	G	G	G
Canned Meat Products	G	G	G	G	G	G
Canned Meat Balls, etc.	G	G	G	A	G	G
Cocoa and Chocolate	G	G	G	G	X	G
Coffee	G	G	G	G	G	G
Edible Fats and Oils	G	G	M	G	G	G
Fish and Fish Products	A	G	G	A	G	G
Food Additives	G	G	G	G	A	X
Gelatine	G	G	G	G	G	G
Glucose in Jams	G	G	G	—	X	G
Honey	G	G	G	G	G	G
Ice Cream and Related Products	G	G	G	G	G	M
Jelly Crystals and Mixes	G	G	G	G	G	G
Labelling of Canned Hams	G	G	G	G	G	G
Lemon Butter	—	G	G	—	A	G
Margarine	—	G	—	M	G	G
Marzipan	A	G	G	G	G	G
Meat and Meat Products	—	G	M	A	M	X
Metals in Food	G	M	G	G	G	G
Milk — Condensed	G	G	G	A	G	G
Flavoured	G	G	G	G	G	G
Malted Milk Powder	G	G	G	—	G	G
Skim	G	A	G	A	G	—
Pickles	A	—	G	—	G	G
Prescribed Colourings	G	G	M	G	G	G
Preservatives	G	G	—	—	M	M
SO ₂ in Dehydrated Vegetables	G	G	G	G	G	G
Spices, Mixed Spices, Condiments ..	G	G	G	G	G	G
Sugar and Glucose	G	G	G	G	A	G
Tea	G	G	G	G	G	G
Vitamins and Minerals	G	G	G	G	G	G

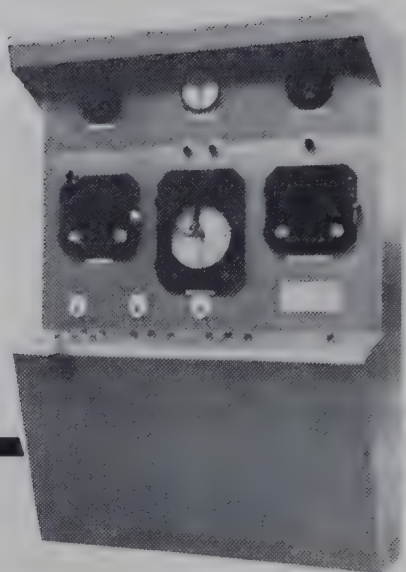
G = Gazetted unchanged

M = Gazetted with modification

A = Approved by State but not yet gazetted

X = Approved with modification by State but not yet gazetted

— = No action yet taken by State Food Advisory Committee



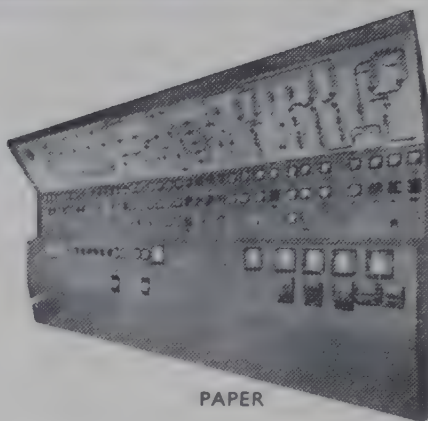
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FOR A DIVERSITY OF INDUSTRIES

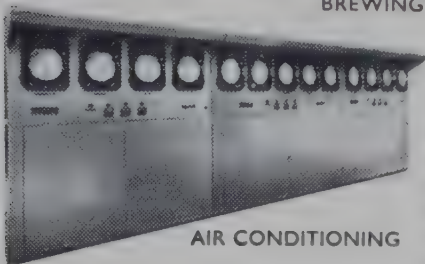
FOOD



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While Taylor can furnish any type of instrument cabinet, console, graphic or non-graphic, they do more than this. They provide process control systems carefully designed and completely engineered to meet specific process needs and space requirements.

Taylor panels not only simplify process operation, but in addition they create a new pride in plant appearance and the efforts of plant personnel to obtain faultless performance. They will be a source of pride and satisfaction for many years to come.



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FRUIT JUICES

At the meeting in May of experts on standardization of fruit juices, set up by the U.N. Economic Commission for Europe, tentative agreement was reached on standards for orange, apple and grape juices for human consumption and preserved by physical means.

EASY-OPEN CAN

A good portion of the United States 1964 sardine pack has gone to market in a new easy-open aluminium can. In overall appearance, the new can closely resembles the standard rectangular sardine can, but the cover is equipped with a tab that embodies the features of the lift-tab beer can and the easy-opening citrus concentrate can.

The size of a man can be measured by the size of the thing that makes him angry.

— J. Kenfield Morley

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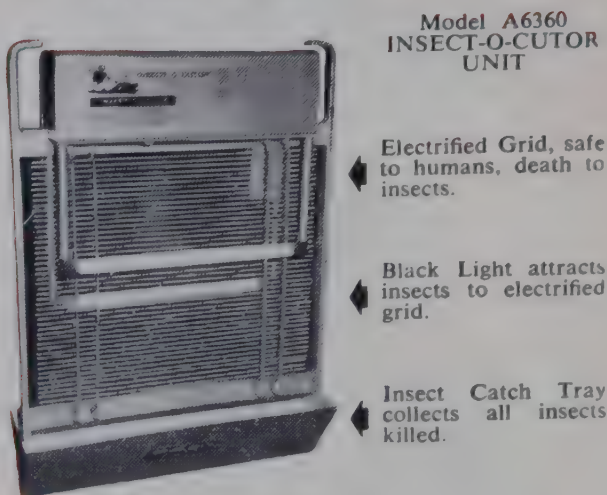
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Q. What is it?



Ans. This is a picture of a fly being electrocuted.

Q. What did it?



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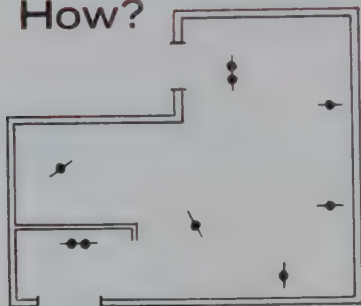
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Q. How?



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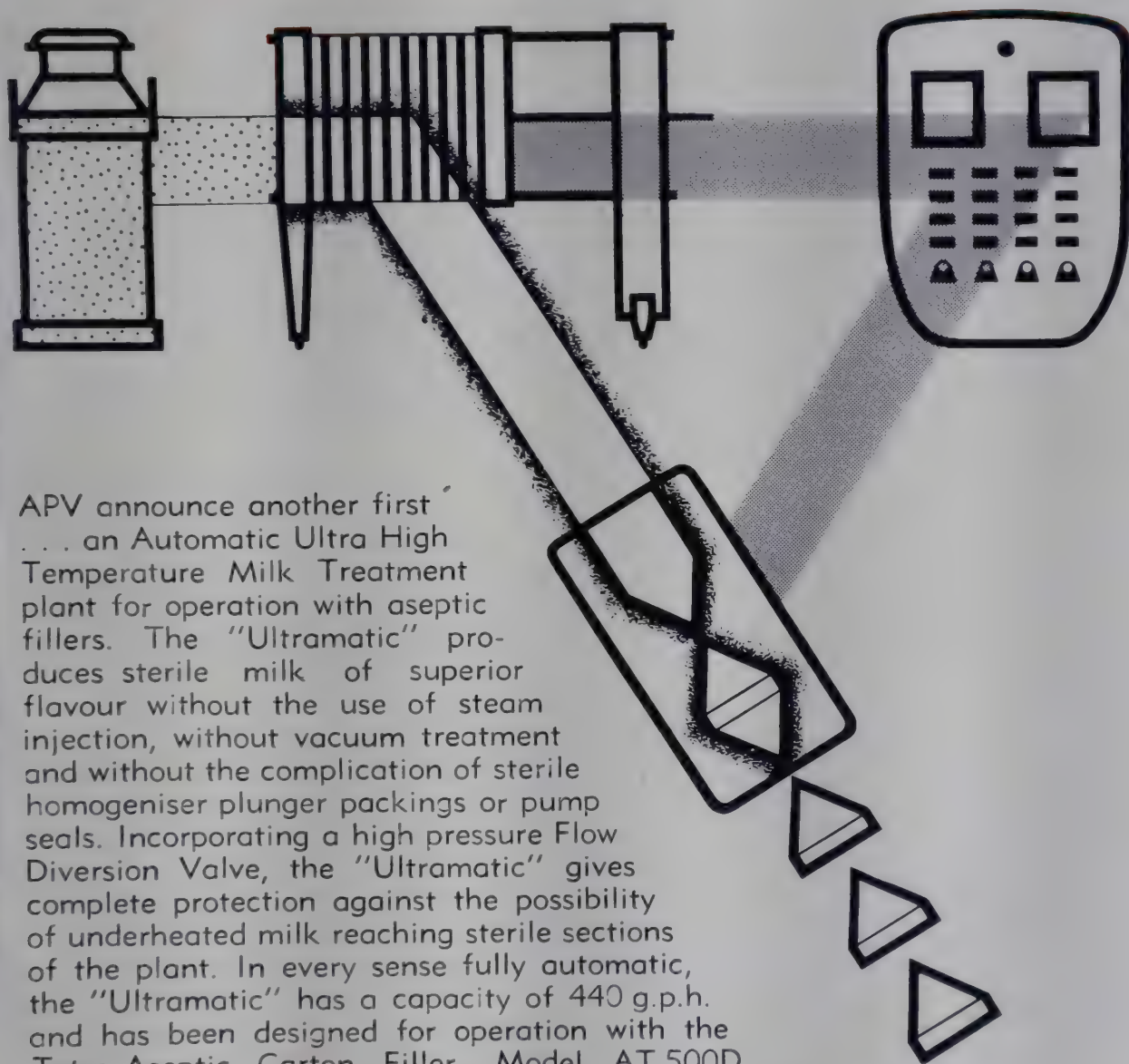
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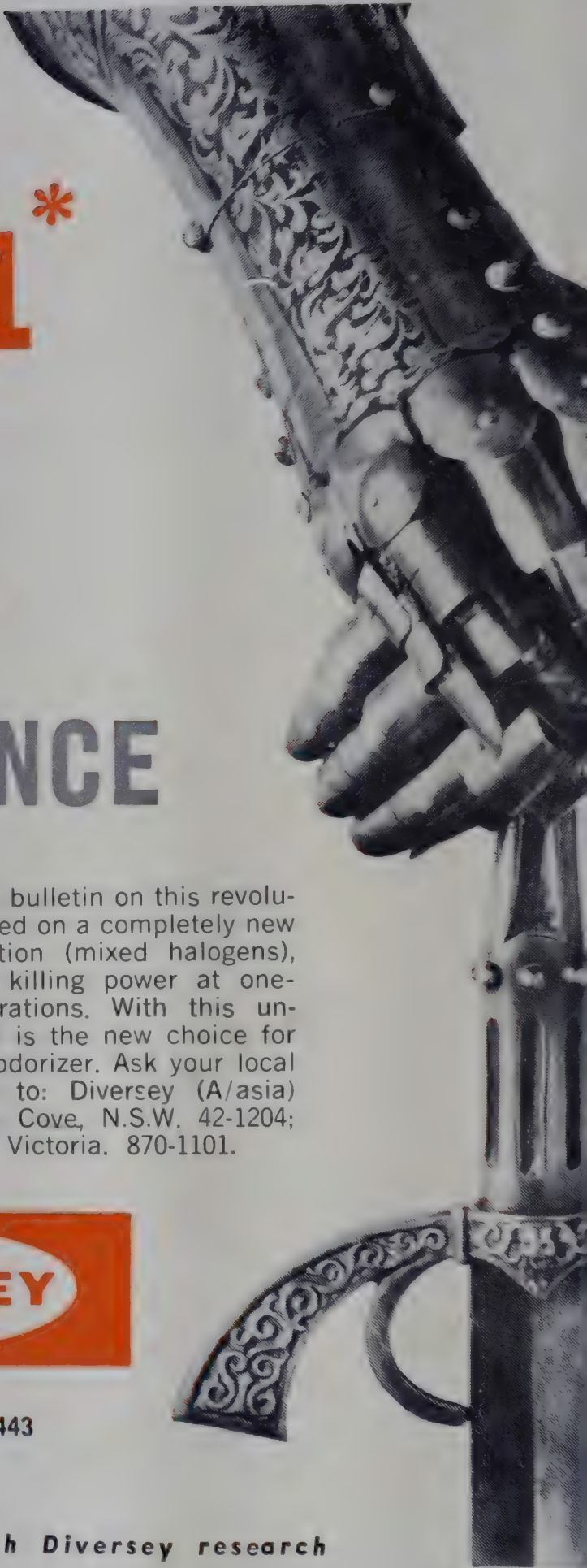
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FOOD TECHNOLOGY



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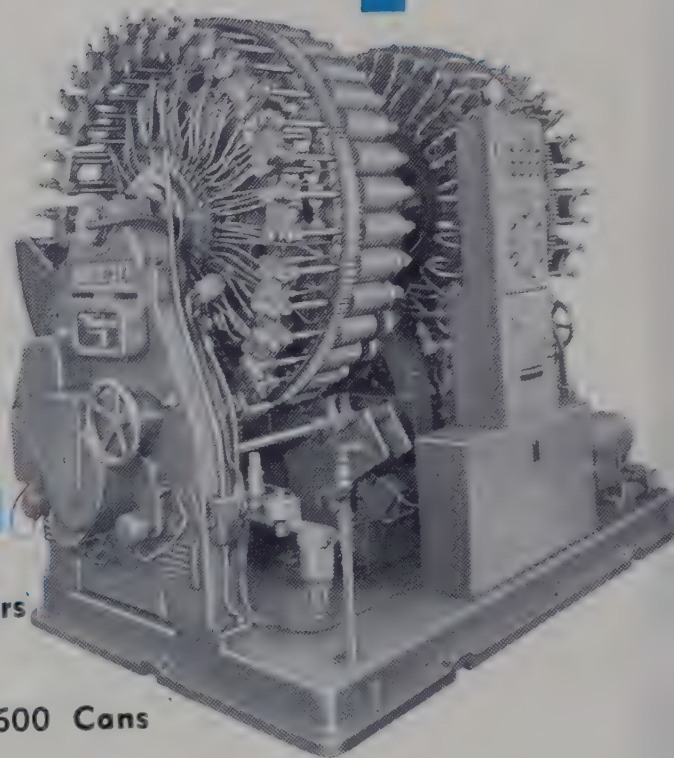
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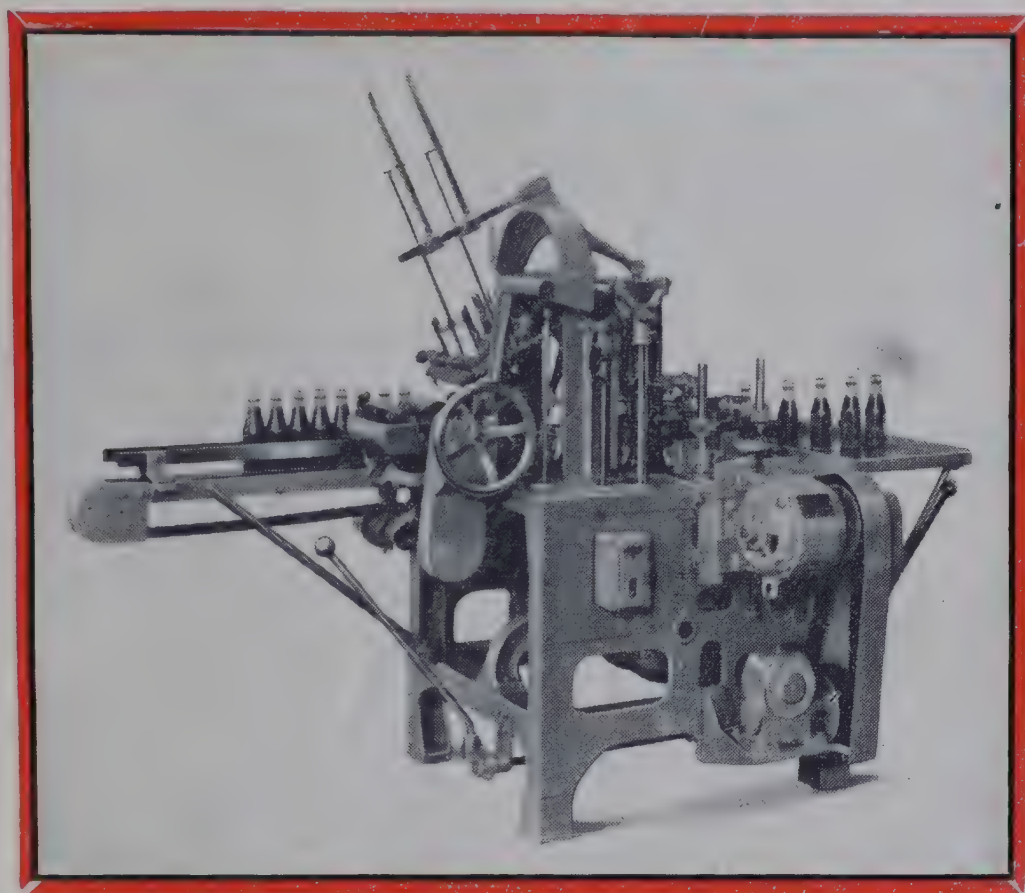
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Editor:

F. H. REUTER, Ph.D., F.R.I.C., F.R.A.C.I.
Associate Professor of Food Technology.
The University of New South Wales.

Business Manager:
S. M. ADAMS

Office:
12 O'Connell Street, Sydney, N.S.W.
Telephone: 25 5401.
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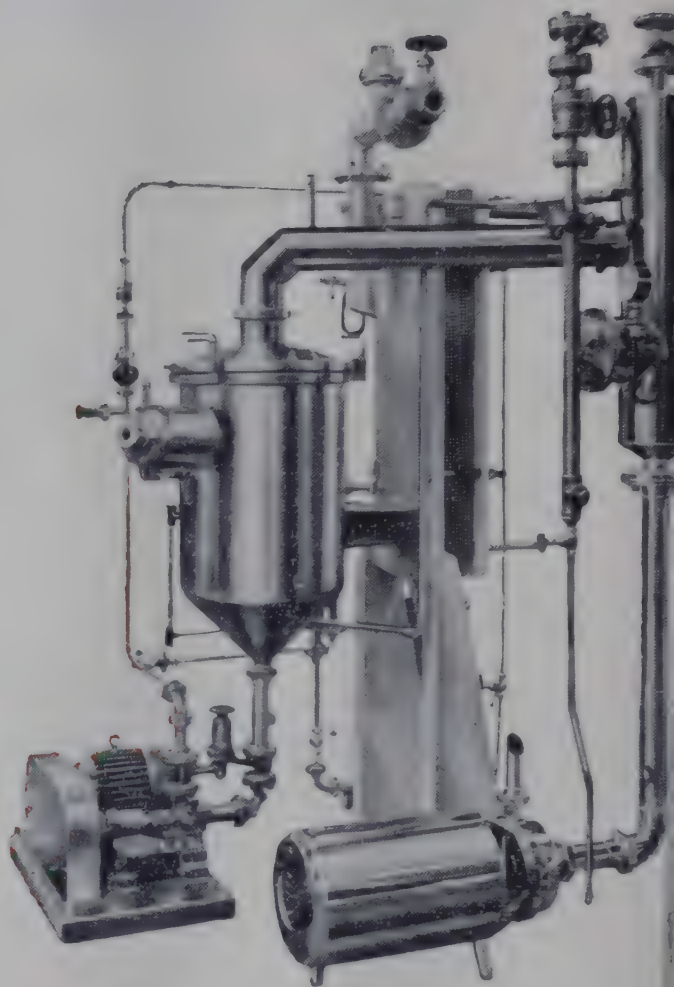
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The Australian Institute

The question of the formation of an Australian professional institution for food technologists was discussed at the 1964 I.F.T. Convention in Canberra. The matter has since been put to a postal vote and a great majority of the members of the two Australian Sections of I.F.T. have voted in favour of establishing such a body. An *ad hoc* committee is now active in Sydney in drawing up a constitution for presentation at the 1965 Convention in Adelaide.

It is therefore of some interest to see what kind of constitution the British organization gave itself about a year ago and compare it with that of the corresponding South African one which is a few years older.

The British body calls itself "The Institute of Food Science and Technology of the United Kingdom", thus following the recent trend of including status giving *Science* in the title. Similarly it is "The South African Association for Food Science and Technology". The American Institute of Food Technologists carried its simpler appellation for almost a quarter of a century. When it recently asked members whether they wished to have it enlarged by the inclusion of *science*, they turned it down.

It will be interesting to see what it will be here. If you look for precedents, there are the Institute of Agricultural Science and the Society of Dairy Technology.

The U.K. Institute's constitution sets out very explicitly the objects for which it was established, probably for very good legal reasons. These are the objects:—

"To promote and further the knowledge development and application of science and technol-

ogy to every aspect of food by all appropriate means; to further the education and training of, to act as the professional body of and to promote the professional standing, efficiency and usefulness of food scientists and technologists, and for all these purposes:

To conduct examinations and grant certificates and diplomas. To form a library of books works manuscripts and films. To arrange lectures and discussions, to exhibit apparatus and demonstrate experiments.

To print, publish, illustrate, translate, sell, lend or distribute any information relating to the objects or proceedings of the Institute.

To collaborate with other bodies concerned in the various disciplines represented in food science and with other organizations concerned with or interested in the various aspects of food technology.

To keep an appointments register."

It should be noted that the Institute may conduct its own examinations and grant certificates. In doing so, it would follow the practice of the Royal Institute of Chemistry which operates its own system of associateship and fellowship examinations.

There are four grades of membership. *Student members* must not be under eighteen years of age, and *licentiates* at least twenty-one years. A *licentiate* must either have an appropriate university degree or equivalent academic or professional qualifications. Alternatively Council may accept academic or profes-

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sional qualifications as evidence of adequate educational attainment. As a further alternative route of entry to the grade of licentiate¹ship a person may qualify by passing the appropriate Institute examination. It also is possible for a person to qualify for licentiate¹ship by satisfying Council by virtue of his experience in the field of food science and technology, by the responsibility of his employment and by any additional evidence acceptable to Council that he is a person so to be admitted.

To qualify as an *associate* a person must not be under twenty-four years of age. He must have at least three years of appropriate experience in food science or technology, and hold a first or second class honours degree or equivalent academic or professional qualifications or have passed the appropriate Institute examination. In the absence of an honours degree, other academic or professional qualifications combined with at least four years of professional experience may suffice for admission to the grade of associateship. A further alternative qualification for entry at this level of membership may be a person's established reputation as a food scientist or food technologist.

A *fellow* shall normally not be under thirty-three years of age, must qualify for associateship and have not less than ten years of appropriate experience in food science or food technology. He must also have made a substantial contribution to the science or technology of food or have reached a position of seniority and authority in the profession acceptable to the Council.

In accordance with the practice of British professional institutions, members are entitled to the exclusive use of initials after their name: *F.I.F.S.T.* for fellows, and *A.I.F.S.T.* for associates. Only associates and fellows have the right to vote on Institute matters.

The South African institute has four grades of membership, but does not offer examinations of its

own as a means of entry. A *Member* (written with a capital "M") must have a university degree or equivalent. He may also be a person with at least five years of experience in a position of responsibility which required knowledge of some aspect of food technology. An affiliate is a person who does not qualify for membership but who is or has been actively engaged or who is interested in any activity related to food science or technology.

The grade of *Institution Member* is open to a company, research institute or other body engaged directly or indirectly in food science or technology. Both the U.K. and S.A. bodies provide for honorary membership.

The South African institute bestows no letter carrying privileges on its members, neither do the Australian Institute of Agricultural nor the Institute of Dairy Technology. It will be interesting to see what kind of institute we will have.

DEFINITIONS

PURE RESEARCH: Scientific investigations, theoretical or experimental, aimed at the elucidation of the scientific principles lying behind observed or predicted phenomena. The work may be undertaken in a field which it is hoped will be of practical benefit to the community, or it may prove no foreseeable practical application.

APPLIED RESEARCH: Work carried out where the scientific principles have been reasonably well established and in which more information is required to confirm whether or not these can be translated into practical terms.

DEVELOPMENT: The use of existing research information, from a variety of fields, to produce a commercially feasible prototype.

S. Encel, quoting in the "Australian", (13.8.64) from the Report on the D.S.I.R. Conference on the place of research in industry.



ENZYMES IN THE FOOD INDUSTRY

By A. M. STRONG,
Halcyon Products, Melbourne

The title of this symposium is "*Enzymes in the Food Industry*" and this covers a tremendously wide field. To narrow it down a little I would like to quote to you from the Victorian F.T.A. "*Book of Proteins*", where we find the statement:—

"Enzymes are present everywhere in Nature: in all living matter — in vegetables, meats, fish, moulds, yeasts, bacteria, etc., and they represent the greatest enemy of the food canner."

Though this quotation has been taken from its context, it does represent the outlook of quite a few people in the canning industry and probably you can't blame them. They have thought only of the enzymes originally present in foods and their thoughts have been limited to how quickly and how easily they can destroy them.

This is of course the basis of the *blanching* operation in fruit and vegetable processing where the Peroxidase, Poly-phenol oxidase, cellulose amylase and other plant enzymes present are inactivated by exposure to steam or hot water before the products are further processed. The tomato juice and orange juice industries must also heat treat their products to inactivate the pectin methyl esterase present. If this were not done the enzyme would attack the pectin present and allow the juice to separate into a clear serum and a fibrous mass.

The cathepsin and other proteases naturally present in meat, assist with the *ageing* or tenderizing of meat and are then either de-

stroyed by heating, inactivated by freezing, poisoned by smoking, or desiccated by salting and drying.

Many enzymes present in food are helpful to the food technologist and of these pride of place goes to the alpha- and beta-amylases of wheat and barley. It is difficult to imagine the food industry without the traditional brewing and baking industries; it is even more difficult to imagine what this convention would be like with no bread and no beer.

I have mentioned these enzymes naturally present in foods only briefly because this symposium concentrates on the addition to food of commercially produced enzymes. The subject will be approached from the point of view of the enzymes available, their characteristics and properties. With the exception of a few major uses, it will be left to potential users to see for themselves the application of these enzymes to their products. We are adopting this approach because the majority of successful applications will come from co-operation between enzyme supplier and food manufacturer.

Most of the literature and data sheets available from overseas are not relevant to Australian conditions and it is necessary to start from first principles with each product. The food manufacturer should state clearly the modifications to his product required and then work closely with his enzyme supplier to achieve the desired result.

An address to the 13th Convention of the Institute of Food Technologists, Australian Regional Sections, Mildura, Vic., 1963.

AMYLASES

The most important commercially produced enzymes are the amylases, and these are classified as alpha, beta, or gamma, according to their specific action on the glycosidic linkages of starch.

Alpha amylases have an affinity for alpha 1-4 linkages near the centre of long amylose and amylopectin chains and rapidly break down the chains to smaller dextrans, with the production of very little sugar. Beta- and gamma-amylases however have an affinity for the non-reducing chain ends. Because of their steric configuration they also weaken the linkages either two or one units down the chain, thus splitting off either maltose or glucose. Whereas however the beta amylase action stops at an alpha 1-6 side chain linkage, leaving a large *limit dextrin*, the gamma amylase can split the alpha 1-6 linkage and thus reduce dextrans completely to glucose.

PROTEASES AND PECTINASES

Next in importance are the proteases and pectinases and for convenience these have been treated together in a paper by Mr. D. W. Grover of Mauri Brothers & Thomson Research Laboratories*. The pectinases are very closely related to the amylases as they both split the alpha 1-4 glycosidic bonds of polysaccharide chains. However in commercial practice they constitute a separate enzyme group and we will treat them as such.

These three enzyme groups, amylases, proteases, and pectinases, are already being used in Australia at the rate of tons per year, a point I would like to stress. We are apt to think of the application of enzymes to the food industry as something to come in the future, whereas they are actually being used in quantity right here and now.

After these three tonnage enzymes there is a big drop down to the other enzymes of commercial significance, Glucose Oxidase — Catalase, Lipase, and Cellulase.

*See this Journal, Jan. issue, 1965.

GLUCOSE OXIDASE

Glucose Oxidase is a fungal enzyme produced by the surface cultivation of a mould. It possesses the specific property of catalyzing the oxidation of glucose to gluconic acid and hydrogen peroxide. If the enzyme catalase is then added to the reaction mixture to decompose the hydrogen peroxide, the overall reaction becomes:—



This reaction is almost quantitative and will proceed until one or other of the reactants is exhausted. The reaction was first studied as a means of removing oxygen from a system but this application was very soon overshadowed by the commercial success of the reaction as a glucose remover.

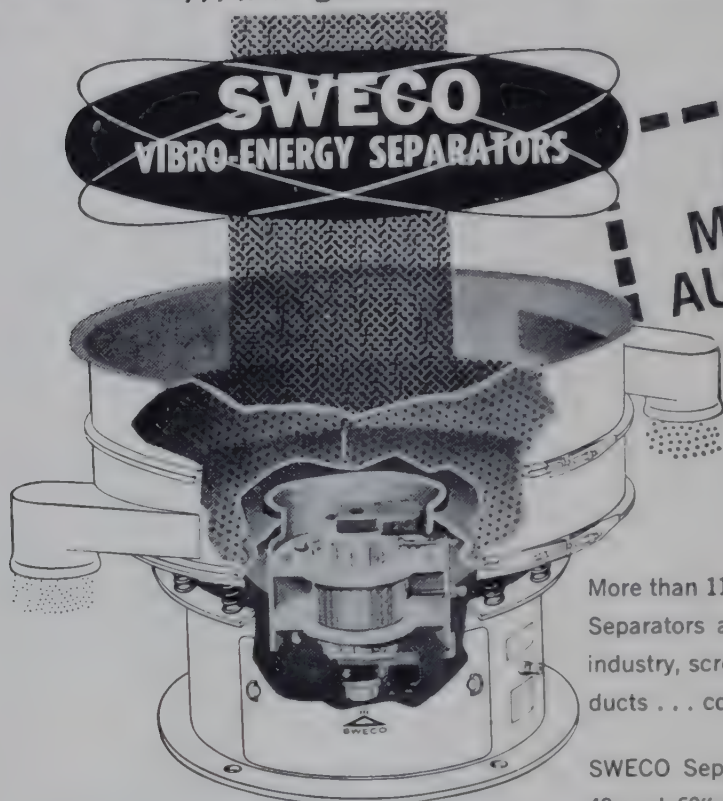
Liquid egg white contains less than 1 per cent of glucose but it is found that during drying this glucose undergoes a Maillard type reaction with the egg albumen, producing a brown discoloration. If however, the glucose is first oxidized to gluconic acid the Maillard reaction cannot occur.

Commercially this is accomplished by the addition of small amounts of glucose oxidase and catalase to a batch of egg whites held at approximately 59°F for 10 hours. During the reaction an excess of oxygen is maintained by continuous addition of small amounts of hydrogen peroxide. This process yields a liquid albumen completely free from glucose which can then be heat processed without any fear of browning taking place.

Because of the relatively high cost of the enzyme no other glucose removal application has reached commercial proportions and the future of the enzyme system probably lies in the oxygen removal field. Wherever a medium or high priced food product is having its shelf life reduced by traces of dissolved oxygen there is a chance that Glucose Oxidase — Catalase can be of assistance. For solid packs the

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enzyme is available in a sachet, mixed with glucose and dampened. These sachets can efficiently scavenge the last trace of oxygen from a sealed pack which has been swept with nitrogen.

LIPASES

The lipases are produced commercially from a wide variety of sources. They are extracted from animal and vegetable sources but recently the trend has been to production from fungal sources. They do not appear to be being used to any great extent, the major use being the manufacture of various types of Continental Cheeses. Their use has been advocated for modifying the butter fat of milk before it is powdered for subsequent manufacturing. However this process requires very careful control as the enzyme is liberating butyric and caproic acids in the product and the results of over-doing it can be readily imagined!

CELLULASE

Cellulase has been left till last because I firmly believe that before long the last shall be first. There is a wide variety of cellulases available and some of them are able to break native cellulose right down to glucose units in fairly high yield. With carboxy methyl cellulose as a substrate the yield is 95 per cent. There can hardly be a food technologist here today who does not deal with some type of cellular material and in many cases some degree of cellulose break-down would be desirable. The most obvious application is in fruit juices and pulps and in a series of experiments which we carried out recently we have found that the addition of cellulase to orange pulp gives a substantially greater yield of juice and also liberates some aromatic compounds.

The snag is of course the price, and this has kept cellulase in the category of a laboratory curiosity. However enzyme manufacturers are investigating the possibility of

switching over from the costly surface cultivation of fungi to a cheaper submerged fermentation method. They are confident of success and envisage the day when cellulase will be cheap enough to allow commercial production of glucose from cellulose.

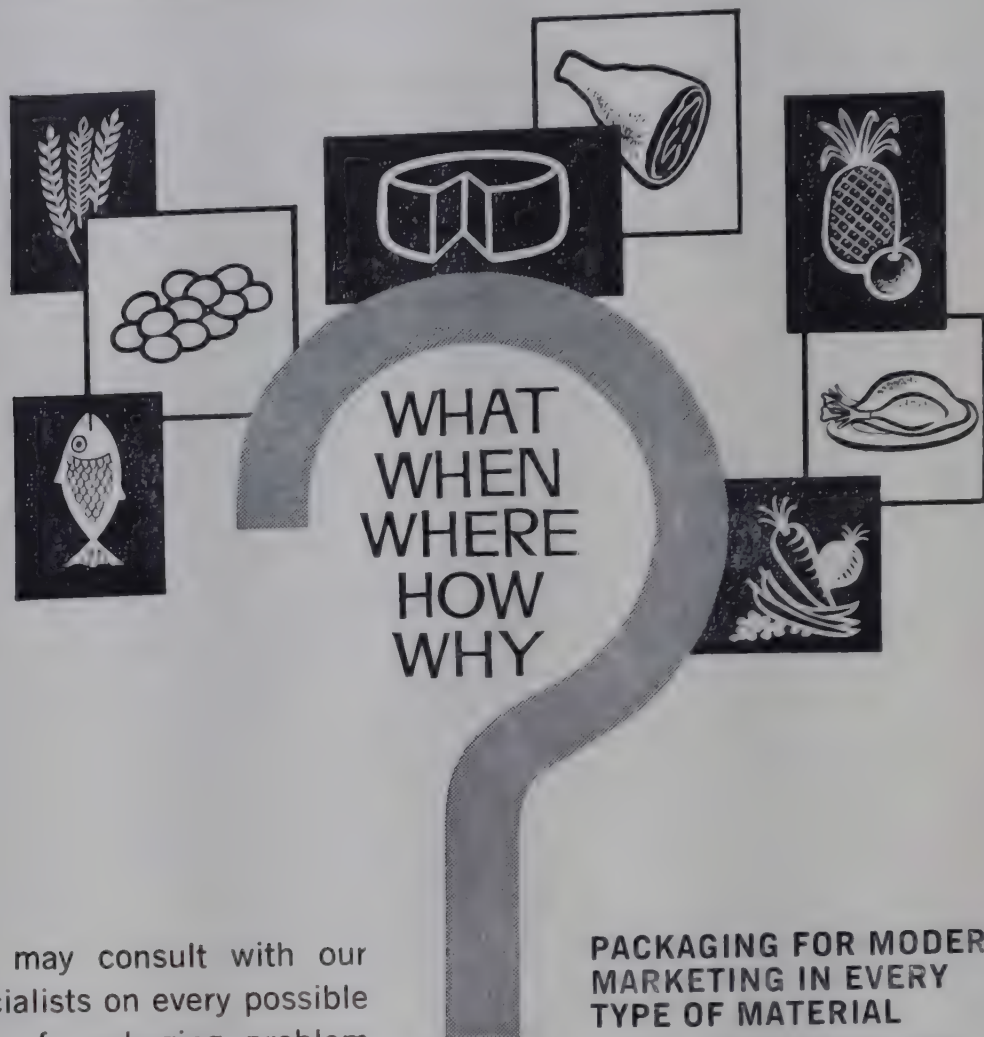
GLUCOSE FROM STARCH

In the time remaining I would like to mention some experimental work which we have been carrying out on the enzymatic process for the manufacture of glucose.

Glucose has traditionally been manufactured by a single stage hydrolysis by hydrochloric acid of starch. This process is carried out at elevated temperatures and pressures and the equipment is relatively expensive as it must resist the hydrochloric acid. The acid hydrolyses the starch first to dextrins, then to sugars and finally to glucose. However the practical limit is a *Dextrose Equivalent* (D.E.) of 65-70 and if the process is pushed beyond this point off-colour and off-flavours are produced.

The enzymatic process for manufacturing glucose is a two stage process. Firstly the starch is converted to dextrins by hydrolysis with an alpha-amylase. The dextrins are then hydrolyzed right through to glucose by a gamma-amylase. These gamma-amylases are an excellent example of the rapid growth of the enzyme industry as less than ten years ago they had not even been isolated. They have been produced on a commercial scale for about five years and today they are produced by the ton, mainly from *Aspergillus Usamii* and *Aspergillus Niger*. Our product, is however produced by submerged culture from *Rhizopus Niveus*.

With the enzymatic process Dextrose Equivalents of 96 to 97 are achieved and very little, if any, colour is formed. Subsequent purification, filtration, and crystallization from the solutions are comparatively easy operations and the



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whole conversion process can be carried out in simple equipment.

All this sounds like an ideal process and overseas this has proved to be so.

In Japan almost the entire production of glucose is manufactured enzymatically from sweet potato starch. In Europe and the U.S.A. more emphasis has been placed on making the initial conversion to dextrins by acid hydrolysis. There are several factors bearing on this:—

The maize starch commonly available is not as susceptible to enzyme attack as potato starch.

Most firms in this field already have large and expensive acid hydrolysis plants which they might as well use.

The price of hydrochloric acid is low in Europe and the U.S.A. compared to the higher price in Japan and the atrocious price in Australia.

However it is the Australian glucose industry which we are interested in and here the picture is not so happy. The principal reasons for this are:—

High glucose content syrups and powdered glucose are not in such demand here as they are overseas. The enzyme process doesn't work particularly well on Australian wheat starch. The required Dextrose Equivalent of 97 is either not reached at all or only with excessive enzyme consumption giving solutions with milky haze and difficult to filter.

This was true of most commercial gamma-amylases which we examined though several of them performed well if the initial conversion was done with hydrochloric acid.

— To be concluded

It seems to me important that men of good will should make an effort to understand how the world ticks; it is the only way to make it tick better.

— C. P. Snow,
"Science and Government".

RAISIN PASTE THAT DOESN'T HARDEN

An article by K. Robe in "Food Processing" (April, 1964) discusses a new process under development at U.S. Department of Agriculture Western Regional Research Laboratory, Albany, Calif., and public-service patent application, for the production of raisin pastes which keep soft over long periods of time.

This process is extremely simple. The raisins are ground and then immediately heated in a jar, can or carton from one half to several hours depending on the temperature. The product thus produced remains soft and spreadable for weeks (up to at least 5 months) without additives. Optimum time-temperature relationships have not been studied but storage tests indicate that the best processing is far from critical. Shorter-higher temperature treatment is favoured, however.

No full range shelf-life studies have been made nor are they planned.

LACTIC ACID IN JAMS

Tests were carried out at the Institute for Research on Storage and Processing of Horticultural Produce (IBVD), Wageningen, Netherlands, to investigate organoleptically the quality of standard apricot jam to which had been added varying concentrations of citric acid or of three samples of lactic acid. Jams were stored in the dark at 37°, 59° and 68°F and in daylight at room temperature and were examined immediately after manufacture, after six months and after one year of storage.

It was concluded that use of the different acids made no difference to taste and flavour. Jams to which one of the lactic acid samples was added had a better colour after six months storage than those containing citric acid. Jams stored at 37° and 59°F had a better colour than those stored at 68°F and at room temperature.

Cans For The Canning Industry

Part 1: The Types of Cans

The most common types of cans have:

- (i) plain tinplate bodies and ends,
- (ii) plain bodies and lacquered ends,
- (iii) lacquered tinplate bodies and ends,
- (iv) bodies *post-lacquered* or *side-striped* after fabrication†

In these notes, only the *interior* surfaces of the cans are taken into consideration.

TYPES OF TINPLATE

The tinplate for making cans is tinned either by dipping in molten tin or by electrodepositing the tin.

Hot-dipped tinplate

Two qualities generally in use are:—

Common tinning, with a tin coating averaging 1.25 lb (24 g/m²) per basis box;

A more heavily coated tinplate with a tin coating averaging 1.50 lb (30 g/m²) per basis box.

Electro-tinplate

For electro-tinplate the following qualities are available:—

coating 0.25 lb./b.b. (5.6 g/m²);

„ 0.50 lb./b.b. (11.2 g/m²);

„ 0.75 lb./b.b. (16.8 g/m²);

„ 1.00 lb./b.b. (22.4 g/m²).

†The objective in these two types is to provide a can in which all bare tinplate surfaces have been eliminated, starting from tinplate that has been lacquered in the flat.

Cans are called **post-lacquered** when the second coat of lacquer is applied by spraying over the whole interior surface. Cans are called **side-striped** when the sprayed lacquer is limited to the side seam, which is the most delicate area. In the case of side-striped cans, very special precautions must be taken during fabrication to avoid imperfections or injuries to the lacquer on the other surfaces of the can.

The precautions to be taken by the user to avoid scratching the coating of lacquer, for both these types of can, are of great importance particularly with regard to the ends.

In addition to these, there are *differential* grades in which the tin coating on one face is lighter than the other; the heavier face is usually used for the interior of the can.

The figure for the tin coating weight on one face of differential tinplate is the figure that would apply if both faces were of that thickness; a differential tin coating of 22.4/5.6 means that one face of the sheet bears 11.2 g tin/m², and the other side 2.8 g/m².

USES OF THE DIFFERENT TYPES OF TINPLATE

“Charcoal” quality is a heavily coated hot-dipped (1.50 lb or upwards) tinplate. It is used for aggressive products.

“Common” quality (1.25 lb) hot dipped tinplate tends to be limited to the unlacquered parts of cans for aggressive products.

Unlacquered electrolytic tinplate with heavy tin coating can be used for many products.

Electrolytic tinplate of the lighter coating weights is largely displacing hot-dipped tinplate for lacquered elements of cans.

CHOICE OF CANS

The can-maker sometimes offers suggestions as to the types of cans best suited for the preservation of the product, but it is the canner's responsibility to select the right kind of can having regard to his own experience; the nature, composition and style of his product; the price of the can, and so on.

It is possible, however, to give some general recommendations for

From *“Tin and its Uses”*: A translation. *“Recommandations pour l'Utilisation des Boîtes Metalliques”*. Comité Interprofessionnel de la Conserve, 3 rue de Logelbach, Paris 17e.

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Patented Bingham valve and piston assemblies allow accurate filling to within one-tenth of an ounce, depending on model of Filler and type of product.

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the guidance of the users of cans. The products may be classified as follows:—

I. Non-aggressive products.

II. Aggressive (acid) products.

III. Products giving sulphide staining.

In each of these classes we can distinguish:—

a. Products which are satisfactory in contact with tin or may even benefit by it;

b. Products which are adversely affected by contact with tin.

This rough classification does not fit all cases; for example:—

(i) some products may belong to either the one or the other category, according to the nature of the raw materials used or the process of preparing them. For example, the acidification of a product may render it less *sulphide staining*, or may change its aggressiveness.

(ii) certain products that normally do not give sulphide staining may become so by accident. In this connection, there are instances of canned fruits being prepared from fruits which have not been completely freed from the products of fungicidal treatments, such as sulphur powder; or jams prepared with sulphite-containing sugar, or from fruit pulp, preserved with sulphur dioxide and not completely freed of this compound before use. In these cases the remedy is in the choice of the raw materials and in the methods of their preparation rather than in the choice of the can.

((iii) some products become more aggressive as a result of the method of preparation; this happens with strongly caramelized jams, whether due to the cooking or resulting from the cans being cased while still hot. Some by-products resulting from the degradation of sugars are powerful accelerators of corrosion.

1. NON-AGGRESSIVE PRODUCTS

a. For non-aggressive products which are not affected by contact with tin:—

(i) the first three kinds of cans are suitable;

(ii) the use of the post-lacquered or side-striped can is not necessary.

The choice between the plain can and the lacquered can, or the can with plain body and lacquered ends, will be decided according to whether the colour and taste of the contents are satisfactory, or by the appearance of the pack when opened.

Examples

Fruits, fruit juices, and preserves of fruits, which are not aggressive and do not contain anthocyanin pigments; apricots, pears, etc.

Tomatoes (whole, pulp and juice).

Asparagus, mushrooms, green beans, celery hearts, endives, spinach.

Products normally giving sulphide staining, but where the method of preparation reduces the *pH* sufficiently so that the formation of sulphides is limited: beans in tomato sauce, fish in tomato sauce, cauliflower in vinegar.

b. For products which are non-aggressive but sensitive to contact with tin, it is necessary to use the lacquered can. The post-lacquered or side-striped can is not essential; the can made from tinplate lacquered in the flat is satisfactory.

Examples

In this class are products such as jams from fruits containing anthocyanin pigments, whose physical state renders them less corrosive. If jams are not well set, the corrosivity of the fruits makes it necessary to use cans of the Class IIb.

Red beets in brine are satisfactory in cans made from lacquered tinplate.

II. PRODUCTS WHICH ARE ACID AND AGGRESSIVE

Cans made of lacquered tinplate are not suitable. The ordinary type of lacquering in the flat does not give proper protection against corrosion; on the contrary, corrosion is liable to be accelerated at discontinuities in the coating of lacquer, and may lead to perforations.

It is necessary then to use:—

(i) a can that is made either entirely or partially from *plain* tinplate: the corrosion is distributed over a large area of tin which fulfils a protective role in respect of the steel and prevents rapid corrosion of it;

or

(ii) a can in which the lacquer coating has no discontinuities (post-lacquered or side-striped).

The choice between these two types of can will depend upon such considerations as the following:—

a. For many products, a can entirely or partially made of plain tinplate is preferable; the tin, by its reducing action, protects the product against oxidation, and preserves its colour and even its flavour.

Examples

Fruits and fruit juices containing no anthocyanin pigments: small yellow plums (mirabelles), citrus fruits, pineapple, white grapes, fruit salad.

Products that are not naturally aggressive but which become so owing to a relatively strong acidification, such as fish in vinegar sauce.

b. For canned fruits containing blue or red anthocyanin pigments, which are discoloured by tin, it is essential to use either the post-lacquered or the side-striped can. The same applies to beer, which is rendered cloudy by traces of metals.

Examples

Fruits with anthocyanin pigments: red cherries, strawberries, red gooseberries, purple plums.

Pickled red beet, pickled red cabbage.

III. PRODUCTS GIVING SULPHIDE STAINING

a. In the case of low acid products rich in protein, heat processing liberates hydrogen sulphide which combines with the tin of the tinplate and causes blue or brown marbling stains on the insides of cans. When the recommendations given above are not followed, this action of the hydrogen sulphide may occur also on the steel, and give rise to black, powdery ferrous sulphide.

These defects are not objectionable from the toxicological viewpoint, but, according to their severity, they may affect more or less seriously the appearance of the product.

Plain tinplate can therefore, in principle, serve for such packs; but, to improve the appearance of the product, it may be advisable to use lacquered cans or, at least, cans with lacquered ends.

Two classes of lacquers are used:—

Those that provide a barrier impervious to hydrogen sulphide;

Those containing a proportion of zinc oxide, which combines with the hydrogen sulphide (not suitable for products of *pH* less than 6, because of the risk of dissolving the zinc oxide).

Examples

Garden peas, beans.

Brussels sprouts, cauliflower (non-acid).

Fish: tuna in brine or in oil, sardines in oil.

Potted meat, corned beef, roast beef.

Meat specialities: cassoulet, tripe.

b. For certain products, either sulphur staining or both sulphur

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staining and corrosive to tinplate, the use of lacquered cans is inescapable. This applies to light coloured products in which the least trace of stannous or ferrous sulphide would be very noticeable, or for fish that contain much trimethylamine oxide, a compound which causes detinning of tinplate.

Examples

Crustacea, fish balls, conger eel.

It should be noted that the *shelf life of a product* in cans depends not only upon the kind of can used. *Shelf life is reduced*, and so are the taste, aroma, colour and so on, by:

the presence of oxygen and the lack of a good vacuum in the can. failure to cool the cans after processing.

storage of cans at relatively high temperatures.

The precautions that canners should take in the handling, washing, marking, filling, closing, rinsing, processing, cooling, storage and packaging of cans are dealt with in Part II.

— To be concluded

FOOD ADDITIVE LEGISLATION

The Food and Agriculture Organization of the United Nations, Rome, has issued two monographs on the legislation governing food additives in *France* and the *Federal Republic of Germany* respectively. Each begins with a historical introduction, and goes on to describe the procedures for the adoption and amendment of laws, and the organization and operation of control procedures.

A substantial section in each monograph is devoted to current regulations, and covers subjects such as colours, preservatives, flavours, pesticide residues, antibiotics, sweeteners, emulsifiers and stabilizing agents, etc.

Each monograph includes a list of legislation and sources, and a bibliography.

THE ENVIRONMENT FOR CHEMICAL CHANGE IN DRIED AND FROZEN FOODS

In foods treated by dehydration and freezing, water is no longer available as a medium within which chemical reactions can take place during storage. The proportion of water removed determined the effectiveness of the preservation process.

The water contained in a food material can be divided into a number of fractions. The macromolecular fraction is difficult to remove. Most foods are complex mixtures. A comparison of calculated monolayer values with values of bound water, determined by freezing, are given for a variety of foods. There are large discrepancies between these values. The ability of single soluble constituents to diffuse within food materials at immediate moisture levels and at different temperatures of storage in the frozen state is discussed. It appears that, at temperatures between -2°F and about -58°F , some solvent water will still be present in foods and that reactions in solution must still proceed, leading to a slow but progressive change in the quality of the materials.

R. B. Duckworth and G. M. Smith. *Proceedings, Nutrition Society*, 22, 182, 1963.

NEW U.K. TIN PLATE STANDARD

Following a revised nomenclature for tin plate in Great Britain, the new unit of measurement to be known as the Standard Area of Tin Plate (SAT) is 100,000 square inches of tin plate made up in units of 100 (equivalent to 3.1888 basis boxes). The old style was a basis box, consisting of 112 sheets, 20 in. x 14 in., or an area of 31,360 sq. in.

Tin plate will now be sold in terms of nominal thickness, e.g., tin plate formerly described as of 108 lb substance is now known as tin plate of a nominal thickness of 0.0118 in. New names have been given to coating grades.



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DIVISION OF DAIRY RESEARCH

Annual Report

1963 - 1964

The work of this Division has always been closely integrated with the activities of the dairy manufacturing industry which it serves. During the past year however one particular aspect of that integration, the close association between the Australian Dairy Produce Board and the Division, has intensified to a degree that calls for special mention.

The Board has greatly increased the range of its activities during the last five years and is now, in addition to its original role of controlling overseas marketing of butter and cheese, concerned with research and promotion activities, with commercial enterprises for the recombining of dairy products in Asian countries, with the lifting of quality standards of dairy products, and with international dairy activities. The Division has co-operated with the Board in all these fields, and the co-operation has taken the forms, amongst others, of technical responsibility for the recombining processes and the raw materials used, the control of experimental cheese shipments to Japan, and the training of staff for the Asian plants and for other purposes.

CHEESE

Mechanization

The mechanization of the manufacture of Cheddar cheese is a major applied project of the Division.

The first commercial model of the curd fusing machine is being assembled in the Division's Process Building. Manufacture of many components has been finalised or modified in the Division's Workshops. A Bell-Siro Cheesemaker 3 and full-sized cheese vats have been installed to operate in conjunction with the curd fusing machine during testing. The cheese vats are being fitted with automatic control devices developed by three electrical instrument companies in co-operation with the Division. It will thus be possible while the curd fusing machine is in use to demonstrate to the industry an advanced degree of mechanization and automatic control in the first three stages of Cheddar cheese manufacture. Much of the normal equipment has been removed from the process bay to make these tests possible.

Arrangements have been well advanced for the establishment of a selling and manufacturing agency for the Bell-Siro Cheese-maker 3 in the United States. Following some further seasonal incidence there of seaminess in coloured cheese a device for more complete washing of the curd before salting is being developed and tested here.

Experimental Shipments

Technical advice was submitted to the Australian Dairy Produce Board in the planning of an initial experimental shipment to Japan of

low-fat Colby and Cheddar cheese and of cheese packed in steel drums. Assistance was given to the four factories which manufactured the cheese. Mr. Czulak visited Japan to give technical advice and to report on the out-turn of the shipments. The results of shipment in drums was most promising. Since then the manufacture and packaging of a further shipment of 40 tons of cheese in drums has been supervised.

Rindless Cheese

A preliminary study has been made of the influence of the method of stacking wooden boxes of rindless cheese on the rate of cooling. Cooling is slow with block-stacking and provision of even small (1½ in.) spaces greatly increased the rate of cooling. The thermal conductivity of cheese was determined.

Analysis of data collected on the conditions under which white deposits develop on rindless cheese failed to reveal significant correlations of the deposit with pH, moisture, calcium or lactate contents.

A range of commercially available plastic films have been tested by the Dolby methylene blue method for permeability to oxygen. The films found satisfactory are being subjected to further tests under factory conditions. A new method of determining permeability of films and seals, making use of gas chromatography, has given reliable data on the permeability of films and seals to oxygen and carbon dioxide. The gross effect on permeability of even slight wrinkling of the film at the seal has been forcibly demonstrated.

A manual on the manufacture and packaging of rindless cheese for export has been published and circulated to all cheese factories for use in training present and future staff.

Seaminess

Seaminess in Cheddar cheese has assumed considerable importance

in our studies because (a) it is regarded as a commercial defect in the U.S.A., (b) machine-made cheese may be more susceptible to it than cheese made by hand, (c) it is a defect clearly related (since it is a visibly lighter outlining of the milled curd particles, and is linked with failure of these to fuse firmly together) with a major problem in mechanization of stage 4 of the cheesemaking process, the rapid fusing of salted curd particles. Microscopic and microanalytical studies of the seams have shown that, contrary to accepted views, the visible seams are not due to a higher fat content. Spraying the curd with warm water diminishes the seaminess, but not by removal of fat.

X-ray diffraction and ion-exchange studies have recently given new understanding of the nature of the defect, and work under way is designed to confirm and develop the new concepts.

Bacteriological Studies

Work on cheese starter cultures has included a study of the relative ratios of phage-resistant cells in freeze-dried cultures and litmus milk-calcium-carbonate cultures. In the one strain so far examined, there are more resistant cells in the freeze-dried culture. A resistant form of the homologous phage race has been observed in these studies.

An observation that calcium tended to inhibit growth on agar of a strain of *Str. diacetilactis* has led to studies of the effect of calcium ions on this organism.

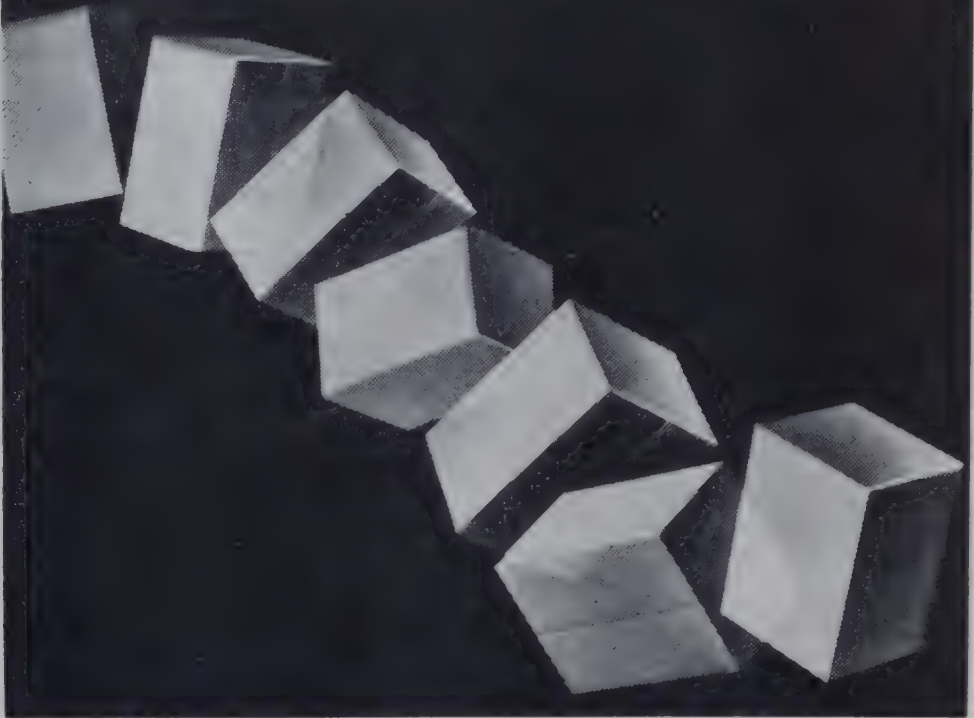
Examination of the phage relationships of the SK series of starter cultures from New Zealand has shown that four of them are phage-related to some of the cultures in current use in Australia.

Newly isolated starter cultures have been studied for classification, including phage-relationship.

A detailed review of the peroxide-catalase system of treating cheese milk referred to last year led finally



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to an adverse assessment and the abandonment of any experimental work. This was based mainly on the fact that pathogenic micro-organisms are not completely destroyed. A paper on the subject embracing these opinions has been published.

MILK PROTEINS

In fundamental work on the chemistry of milk proteins, the understanding of the nature of Kappa-casein has been taken a stage further with the isolation of two of the three major components we had postulated. A paper dealing with the methods of preparation and with some of the properties of these two components has been submitted for publication. With the completion of the amino acid analyzer, which now includes an automatic integrator of peak areas to give even more rapid results, information is being gathered on the composition of these and other casein fractions.

An important new discovery has been the finding that Kappa-casein contains S-H groups, and not only S-S groups as had been thought. Further work showed that this was also true of the whole casein in the micelles. This may have important implications in the processing of milk since these sulphur groups are involved both in flavour and in linkage reactions which affect the state of aggregation of the protein. Papers reporting this work have been submitted for publication.

The seasonal survey of samples of milk from *soft curd* areas in South Australia, together with local control samples, has been temporarily discontinued to permit some amino acid determinations and also an assessment of the results. Seasonal variations affecting both casein and serum proteins do occur, but their significance in relation to the defect has yet to be demonstrated. Variation in SH content could be important and for regular measurement of these we are attempting

to develop a reliable routine analytical method.

Some studies of protein interaction in milk have been undertaken with the practical objective in mind of incorporating the whey proteins with the casein in cheese. Although denatured β -lactoglobulin was found to interfere with the primary action of rennin on Kappa-casein, it did not affect its primary action on the intact micelles. The rate of the subsequent coagulation of the micelles is lowered however. Work on the nature of the lactoglobulin-casein micelle complex is being continued.

Some investigations into new and more economic methods of precipitating and recovering the proteins from whey have also been undertaken.

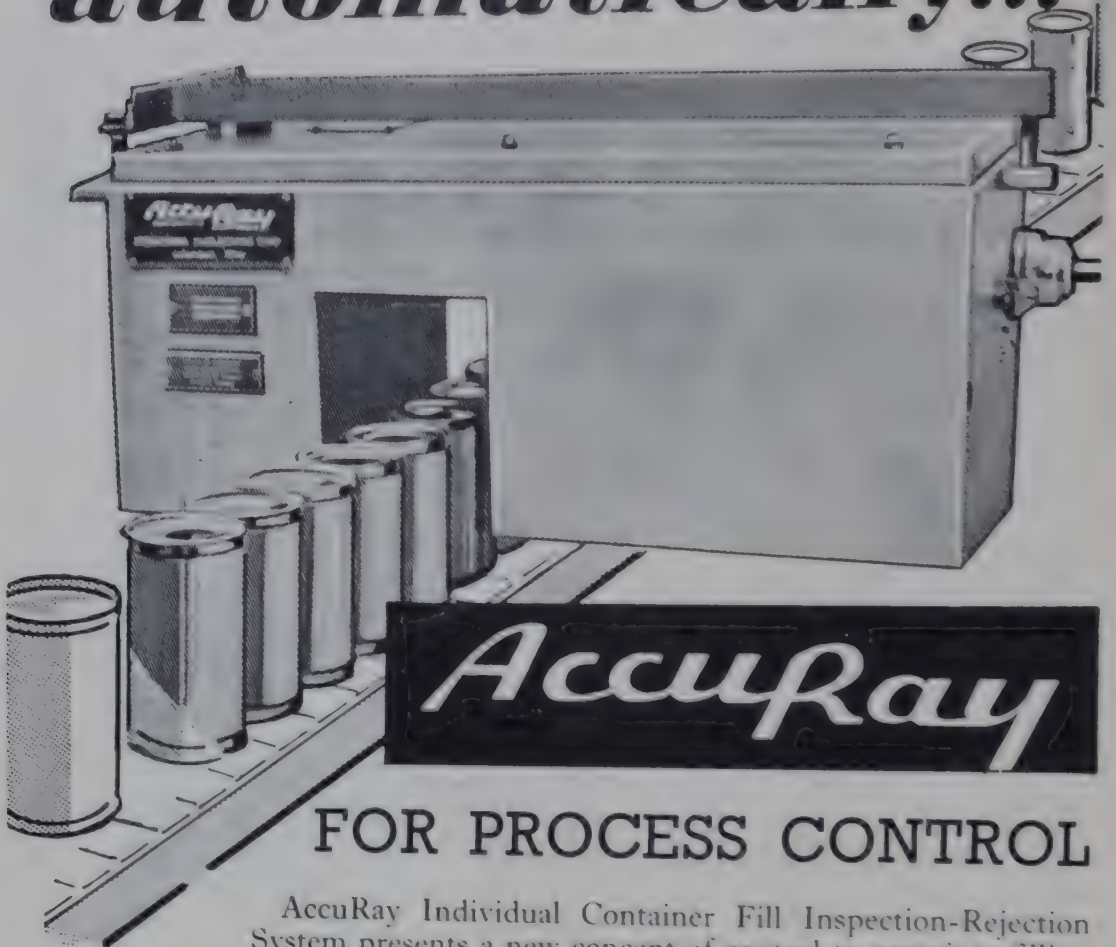
— To be concluded

NEW KNOWLEDGE ON THE FREEZING OF TURKEYS

The appearance of surface bloom of a frozen bird is dependant on the ice crystal size in the skin and in a very thin surface layer of the flesh. The ice crystal size is influenced by the rate of freezing down to about -7°C . In general, for a pleasing appearance rapid freezing is required in an open blast tunnel at a temperature of -29°C and air velocity of 600 ft/min. Under-developed birds, incorrect scalding and chilling temperatures, bruising during defeathering and poor packaging materials can all result in tough flesh and an undesirable bloom. For mature birds the following recommendations are made: Scalding at $59-60^{\circ}$ and prompt chilling to $4.5-7^{\circ}\text{C}$, tenderizing in ice water, packaging in waterproof materials and freezing at -29° to -34°C with air velocity 600 ft/min. Further research has shown that the final stage of freezing may be accomplished in boxed storage at -18°C (0°F).

"J. Refrigeration", 6, (4), 89, 1963. "Bull. International Inst. Refrigeration", 44, 552, 1964

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FROZEN FOOD RETAIL CABINETS

The Standards Association of Australia announces the issue for Public Review and comment of Doc. 910 Draft Australian Standard for Frozen Food Retail Cabinets.

The conditions under which packaged frozen foods are stored, transported and handled prior to sale to the public have been the subject of concern recently by Departments of Health, the National Health and Medical Research Council, the Council of Australian Food Technology Associations Inc. and similar bodies.

The quality of frozen foods deteriorates rapidly if the temperature is allowed to rise above a specific maximum (which varies with different products; vegetables, fish, meat, etc.) or to fluctuate outside certain limits.

As a start to initiate some control over the condition in which frozen foods are supplied to the public, and at the request of the Council of Australian Food Technology Associations Inc., Standards Association of Australia Committee ME/6/F, under the Chairmanship of Professor F. H. Reuter, Associate Professor of Food Technology of the University of New South Wales, prepared Doc. 910, which prescribes minimum requirements of construction and performance of refrigerated cabinets for merchandising of frozen foods, including ice cream.

In the preparation of the draft, consideration was given to overseas national standards related to frozen food storage and display, and in particular B.S.3053 Open and Closed Refrigerated Display Cabinets, and Draft German standard DIN 8954 Requirements for Testing Open Refrigerated Display Cabinets.

Appendices have been included to provide guidance as to the form which test reports should take and to give recommendations regarding

satisfactory operation of Frozen Food Retail Cabinets.

It is required that cabinets be shielded from air currents during testing, because although in actual applications retail cabinets are subject to air movement, testing in moving air would require elaborate and expensive test room facilities and it would be extremely difficult to obtain consistent test results.

The draft specifically requests opinions whether the method specified for determining and testing display area is the most appropriate, because this was subject to considerable discussion during Committee meetings.

The Committee realizes that some aspects of this draft, particularly the requirement included in the draft for cabinets to hold frozen food at or below 0°F, cannot be met by some existing frozen food retail cabinets. It is anticipated, however, that when published the provisions of the standard will be progressively adopted during an interim period.

Constructive comment on the draft is invited from persons experienced in the manufacture or use of Frozen Food Retail Cabinets and such comments should be forwarded to the Headquarters of the Association, 157 Gloucester Street, Sydney, or to any branch office not later than 31st May, 1965.

INFORMATIVE LABELLING — THE SWEDISH SYSTEM

An illustrated account of the Swedish VDN system of labelling consumer goods with details of composition and handling instructions is given in a 16 page *Research Institute for Consumer Affairs* brochure (1963). An example of a label for canned pears is shown. Hopes are expressed for the establishment of some similar system in Great Britain.

Amendments to Food Regulations — New South Wales

GAZETTED 12th JUNE, 1964

Canned Meat Products (Reg. 19A)

To clause (2) was added a provision that the fat content of other canned meat products shall not exceed 20 per cent of the meat content. This provision is in the N.H. & M.R.C. recommended draft for Canned Meat Products and had been omitted when N.S.W. gazetted the other recommendations in November, 1961.

GAZETTED 26th JUNE, 1964

Seven items are involved:—

Irradiation of Food (New Reg. 5A)

This new regulation controls the sale or other disposal of food intentionally or accidentally exposed to ionizing radiation, which term is defined with a wide scope.

Edible Fats & Oils (Reg. 22)

The standard for Olive Oil is amended to refer to the 1963 (instead of 1958) British Pharmacopœia.

Flavoured Milks (Reg. 24B)

Clauses 1 and 2 have been replaced by the standard recommended by the N.H. & M.R.C. modified by requiring the word *flavour* to follow the label statement: "*Imitation (kind of flavour)*". The amendments make the following changes to the old regulation:— Certain listed emulsifying aids are permitted and a minimum S.N.F. of 8 per cent prescribed; flavoured skim milk is defined and a minimum S.N.F. of 8 per cent prescribed. Labelling letter size has been increased. The existing clauses in the Regulations for flavoured reconstituted milk have not been amended.

Ice Cream & Related Products (Reg. 46)

A new clause 7(B) has been inserted defining Dairy Ice Mix as recommended by the N.H. & M.R.C. Consequential amendments have been made to existing clauses 7(B), 7(C) and 7(D).

Drugs (Reg. 70)

References to the 1958 B.P.C. and 1959 B.P. have been amended to refer to the 1963 Editions.

A new clause requires Batch labeling of Aerosol Hair Sprays.

Permitted Colouring Matters (Reg. 76)

The regulation has been amended to correspond to that recommended by the N.H. & M.R.C. The amendments include the following changes:—

Synthetic reproductions of vegetable colourings now classed as permitted colourings; the amount of colouring that may be added, when permitted, is limited; the reference to Rowe's Colour Index has been changed to the Society of Dyers and Colourists' Colour Index 1956.

Protection of Food and Drugs *from Contamination (Reg. 77)*

In clause 5 the prohibition has been extended to the use of tobacco as well as the smoking of it. In clause 7(A) the prohibition is extended to places where any bird is kept. A new Clause 7(A) prohibits manufacture or storage of food for sale in a place where domestic food is prepared or stored unless the place and the domestic food comply with the Pure Food Act and Regulations.

GAZETTED 3rd JULY, 1964

Thirty-two items are involved:—

Labels (Reg. 1)

Clause 2 has been amended to require the particulars to be printed in English.

In clause 4 the words "*of the contents*" have been deleted.

Preservatives (Reg. 2)

Nisin has been included in the list of examples of preservatives.

Vitamins & Minerals (Reg. 3A)

The existing regulation has been replaced by that recommended by the N.H. & M.R.C., a modification of the draft proposed by C.A.F.T.A. The regulation controls the addition of vitamin and minerals to foods and the advertising thereof.

Modifying Agents (New Reg. 3B)

The new regulation is the Food Additives regulation recommended by the N.H. & M.R.C. It lists prescribed modifying agents and prohibits the addition of any emulsifier, stabilizer, modifying agent or other additive unless specifically permitted.

Artificial Sweetening Substances (Reg. 9)

The misprints in clause 2 have been corrected.

Exemptions from Certain Labelling Provisions (Reg. 10)

"*Directions for preparation*" has been included in the exceptions not exempt from labelling provisions. All Bread is now exempt unless sold in a package with written matter pertaining to the Bread. In paragraph 3 "*unsealed paper*" has been deleted and the sale restricted to the premises in which the food is packed.

Flour, Bread & Meals (Reg. 11)

In clause 1(A) the paragraphs relating to vitamins and iron have been replaced by a cross reference to the Vitamin and Mineral regulation.

Fungal preparations of amylases and proteases are now permitted

in flour sold or used for Bread.

A new clause defines Wheat and permits treatment with Malathion provided residue does not exceed 8 parts per million.

The standard for Bread has been extended to permit vitamins and minerals as prescribed in the Vitamin and Mineral regulation.

Invalids Food (Reg. 17)

Cyclamate is now a permitted sweetener in food sold as suitable for diabetics. Declaration of its presence is required.

Vegetables (Reg. 20)

Nisin is now permitted in Canned Tomato Pulp, Canned Tomato Juice and Canned Tomato Paste where pH is below 4.5.

Margarine (Reg. 23)

The paragraphs relating to vitamin A have been replaced by a cross reference to the Vitamin and Mineral regulation.

Milk (Reg. 24)

The clauses pertaining to Skim or Separated Milk and various Condensed Milks have been replaced by the standards recommended by the N.H. & M.R.C. The clause for Concentrated Milk has been deleted.

The changes brought about by the amendments include providing a maximum of 0.1 per cent fat in Skim Milk, changes of labelling requirements and provisions for Pasteurized Skim Milk.

Dried Milk (Reg. 25)

A cross reference to the Vitamin and Mineral regulation has been inserted.

Malted Milk Powder (Reg. 25A)

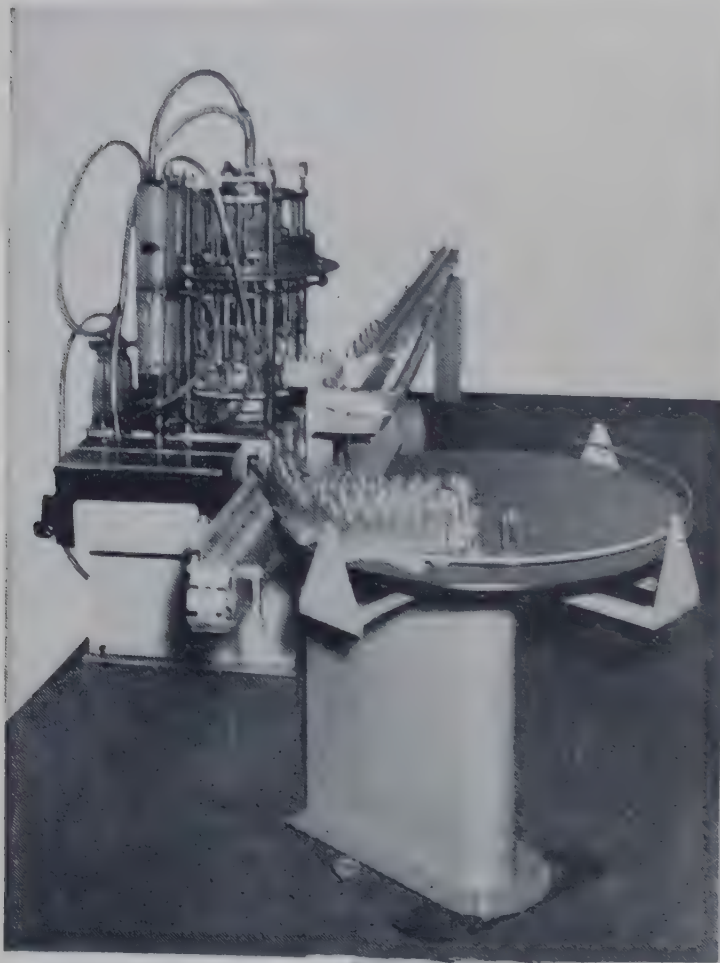
The regulation has been replaced by that recommended by the N.H. & M.R.C. Apart from rephrasing, the main change is the raising of the maximum limit for water content to 5 per cent.

Dried Skim Milk (Reg. 26)

A cross reference to the Vitamin and Mineral regulation has been inserted.

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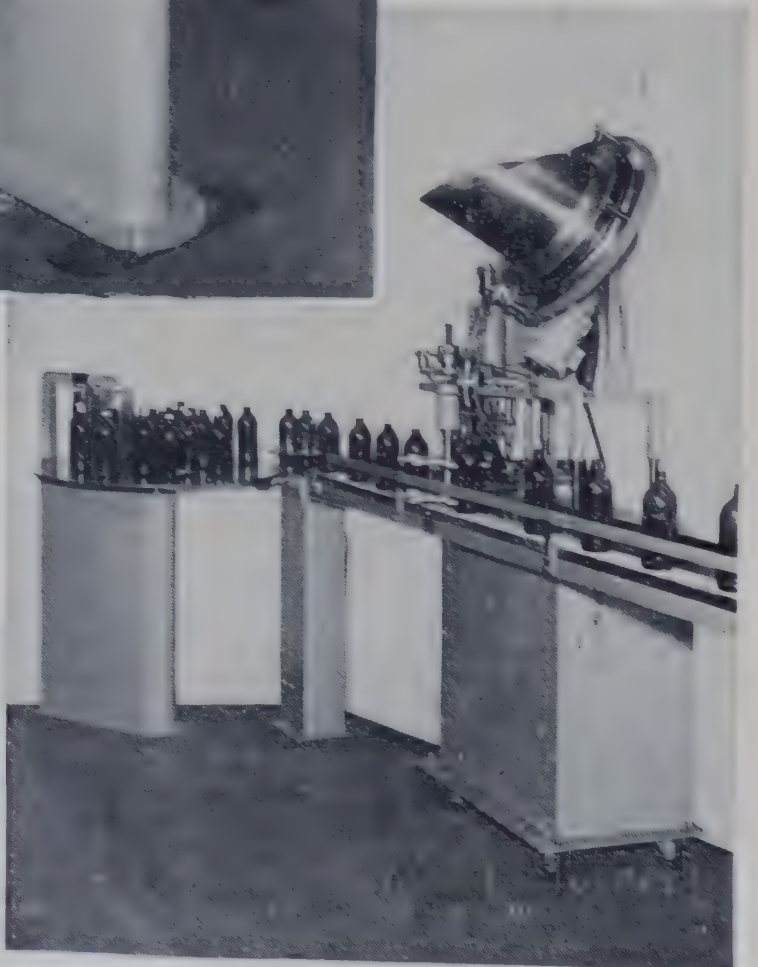
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Butter (Reg. 28)

A cross reference to the Vitamin and Mineral regulation has been inserted.

Cocoa & Cocoa Products (Reg. 34)

New sub-clauses have been added to the clause for Milk Chocolate allowing milk fat to be wholly or partly replaced by cocoa fat in Milk Chocolate in the form of Easter Eggs, Seasonal Novelties and other hollow goods, provided that milk solids are not less than 15 per cent. For such goods there is a prohibition on use of the words "rich", "full cream" or "dairy".

Diabetic chocolate may now contain saccharin or cyclamates without limitation.

Fruit & Fruit Product (Reg. 47)

A paragraph has been inserted to permit the spraying or dipping of apples with Ethoxyquin provided residue does not exceed 3 parts per million.

Sorbic acid is a permitted alternative preservative up to 7 gr./lb in maraschino or cocktail cherries.

Essences (Reg. 49)

Sorbic acid is now a permitted alternative preservative up to 7 gr./pint in imitation fruit flavours, essences or extracts.

Fruit Squash (Reg. 54)

Fruit Juices (Reg. 55)

Fruit Juice Cordials & Syrups (Reg. 56)

In each regulation a cross reference to the Vitamin and Mineral regulation has been inserted and sorbic acid made a permitted alternative preservative.

Concentrated Fruit Juice Cordials (Reg. 56A)

Raspberry Vinegar (Reg. 57)

Flavoured Cordials, Syrups & Bases (Reg. 58)

Imitation Cordials, Syrups & Bases (Reg. 59)

In each of these regulations sorbic acid has been made an alternative permitted preservative.

Non-Excisable Fermented Drinks (Reg. 60)

The addition is now permitted of saccharin up to 0.005 per cent or of cyclamates up to 0.06 per cent. Sorbic acid is a permitted alternative preservative.

Summer or Temperance Drinks (Reg. 61)

Compound Cordials (Reg. 62)

In each of these regulations sorbic acid has been made an alternative permitted preservative.

Spirits (Reg. 68)

A new labelling provision requires the name of the country in which the spirits were produced.

Drugs (Reg. 70)

Colouring matters used in drugs are now restricted to the same permitted colouring matters as are allowed in foods.

Protection of Food & Drugs from Contamination (Reg. 77)

The sale of certain foods from a motor vehicle primarily constructed for the carriage of passengers is prohibited.

In those clauses where the phrase "any food which is ordinarily consumed in the state in which it is sold" occurs, a prior insertion has been made of "Bread, Hamburger Buns, Crumpets, Pastry or".

Prohibited Substances (Reg. 83)

The following additions have been made to the list of prohibited substances:— Saffrole, Oil of Sassafras, Dehydrosaffrole, Isosaffrole and Methyl Cellulose.

GAZETTED 4th SEPTEMBER, 1964

Two items are involved:—

Cocoa & Cocoa Products (Reg. 34)

To the clause for chocolate has been added a paragraph allowing the presence of 0.2 per cent purified Talc as an incidental additive.

Marzipan & Related Products (New Reg. 44B)

The standard recommended by the N.H. & M.R.C. has been adopted.

This defines Ground Almond, Almond Meal, Ground Kernels and Kernel Meal. It defines and standardizes Marzipan, Almond Paste, Almond Icing, Kernel Paste, Imitation Almond Icing and Imitation Marzipan. Labelling requirements are prescribed.

F.T.A. of Q'ld

The Second Technical Luncheon was held at Lennons Hotel, Tuesday, 17th November, and attended by some 45 members. The speaker was Professor V. B. D. Skerman, Professor of Microbiology at the Queensland University.

During his talk, the Professor outlined the organization of the world Council of Microbiology and the functions of the various sub-committees. Professor Skerman also briefly spoke on some aspects of microbiology in the Industrial field.

●

Mr. Roy Casey, President of F.T.A. in Queensland, will be leaving Brisbane in January next year, to take up his new appointment in Sydney as Technical Sales Manager for Australia with Wheat Industries (Aust.) Pty. Ltd. Mr. Casey served with this Company as Queensland Sales Manager, and will be replaced in Brisbane by Mr. E. Liddle.

●

Mr. F. Carter has been recently appointed Technical Secretary of F.T.A. of Queensland. Mr. Carter has been an appointed member of the Committee for many years.

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— Howard W. Newton

C.I.P.C.

The letters C.I.P.C. stand for Comité International Permanent de la Conserve, the Permanent International Committee on Canned Foods.

The Committee was founded in Paris in 1938 to deal with questions of interest to countries producing canned food, and its members are private or official associations or bodies qualified to represent the canning and allied industries. Most of the membership comprises associations in European countries, but the International Tin Research Council is a member, and organizations from many other countries, including Australia, take a close interest in C.I.P.C. activities.

An important activity of the C.I.P.C. is to arrange investigations by specialist groups; another is to disseminate scientific, technical, and practical knowledge useful to the canned food industry and to related industries, such as tinsplate manufacture and can making. It also initiates action on an international level, aimed to lead directly or indirectly to increased consumption of canned foods. Specialist committees may choose to make proposals to a plenary meeting of the C.I.P.C., from which may come recommendations which member delegations convey to organizations in their own countries, or to their governments.

The C.I.P.C. is a private international organization with no connection in law with the governments of the countries represented. It has, however, established relations with official international bodies, such as the Food & Agriculture Organization of the United Nations, for the purpose of expediting the implementation of its recommendations.

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GAS PACKING PROCESS FOR CANNED FOOD

The recent announcement by the Metal Box Co. Ltd. and Engelhard Industries Ltd. of the formation of Catalytic Gas Pack Ltd., to develop and exploit a new method of gas packing, has created considerable interest. Details of this new process, known as *Deoxypak*, are now available.

In the ordinary way, gas packing is a process whereby the air in a sealed container is replaced by an inert gas such as nitrogen or carbon dioxide. It is applied to oxygen sensitive products of which coffee and dried milk are familiar examples. Conventionally, the process involves the use of high efficiency pumps and vacuum tight cabinets, and is essentially a batch-wise operation and therefore slow. Moreover, for maximum shelf life, oxygen levels of the order of 1-2 per cent are required and these are difficult to obtain by this method, particularly in the case of certain types of milk powder in which the air is tightly held within the product.

The *Deoxypak* process makes use of a special catalyst manufactured by Engelhard Industries which, at ambient temperatures, causes oxygen to combine with hydrogen, forming a negligible amount of water vapour. In the case of a can, the hydrogen is introduced by a simple and inexpensive vacuum-gassing machine designed by the Metal Box Company. The catalyst itself takes the form of a small printed or coated paper insert.

The *Deoxypak* system offers the following advantages:—

1. *Reduction in packaging costs.* *Deoxypak* replaces a cumbersome batch process by a streamlined, continuous technique which requires only standard filling equipment. The result is a saving both in labour and floor space.

2. *Improvement in quality and shelf life.* The *Deoxypak* system can

give oxygen figures as low as 0.2 per cent even with highly absorbent products. No other packaging process can achieve this oxygen level.

The *Deoxypak* process is applicable to any hermetically sealed container and is expected to find wide application, particularly among users of tin-cans and foil laminates.

"British Food Journal", July, 1964.

NEW U.S.D.A. TOMATO STANDARDS

New U.S. Standards for Tomatoes for Processing issued recently by U.S.D.A.'s Agricultural Marketing Service offer the prospect of more accurate and equitable grading for the cannery tomato industry.

Providing an expanded choice of grading systems for growers and processors, the new standards supplement the U.S. Standards for Tomatoes for Canning and the U.S. Standards for Tomatoes for Manufacture of Strained Tomato Products, which have been in effect for many years.

The Federal-State Inspection Service grades more than a million tons of tomatoes every year at processing plants — and growers are paid on the basis of grading results. Processors also use grades to help decide whether a batch of tomatoes should be used for juice, catsup, or some other product.

Heart of the new grading system is the U.S.D.A. tomato colorimeter, an electronic instrument that provides a tomato colour index for juice samples.

The colour rating is recorded on the inspection certificate along with the *per cent usable in the load* (determined by inspecting samples and grading them according to defects).

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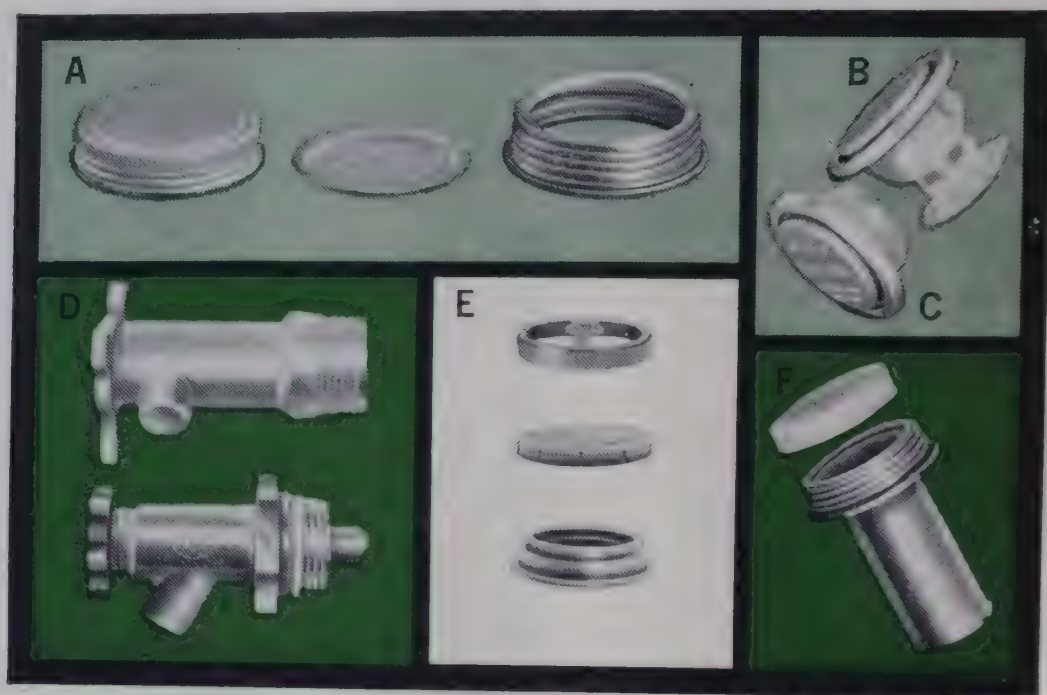
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FOOD TECHNOLOGY ASSOCIATION OF VICTORIA

POINTS FROM THE MINUTES OF THE ANNUAL GENERAL MEETING HELD 28th AUGUST, 1964

AMENDMENT TO ARTICLES OF ASSOCIATION

Notice of motion had been issued to members to amend the Rule governing Membership by adding the words "*but not Trade Associations*" at the end of clause 4(b).

The clause would then read:—

"Persons, firms or corporations, must be, in the opinion of the Management Committee, bona fide Australian manufacturers engaged in the Food Industry, or directly associated with Australian manufacturers in the said industry, but not trade associations."

Mr. Kinsey, President, stated that it had been decided by the Committee that as every endeavour was being made to encourage individual companies to become Full Members of the Association, it would not be in the interests of this Association to accept Trade Associations as members.

It was felt that as Victoria was the only State which had in the past accepted Trade Associations as members, we should fall into line with the policy of F.T.A's in other States. However, Trade Associations would still be contacted in matters concerning their members.

It was then carried unanimously:—

"That the motion as notified to members and set out above be adopted."

FROM THE PRESIDENT'S REPORT SUB-COMMITTEES

(a) Technical Sub-Committee

This Committee met on four occasions during the past year, dealing with six draft regulations as well as numerous changes to drafts

made by F.S.C. and matters brought forward by member companies. There is a lot of behind the scenes work carried out in the interest of members, which is achieving, slowly but steadily, worthwhile results.

Course and Education Sub-Committee

This Committee organized and ran a course of six lectures on "*Statistical Aids to Production*". Lecture notes were provided and thirty-eight enrolled for the course. This was a relatively specialized course but proved successful for those attending. Our thanks are due to the organizer and to lecturer Mr. R. Birtwistle of C.S.I.R.O.

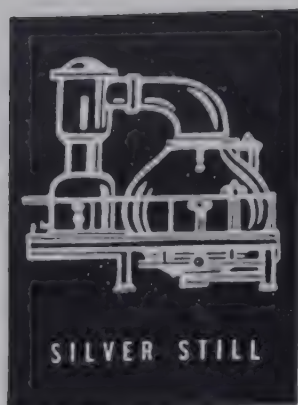
R.M.I.T. Advisory Sub-Committee

Although this Committee has attempted during the year to overcome problems that have arisen at the Royal Melbourne Institute of Technology in Food Technology, the situation is still far from satisfactory. Your Association, through member companies, has donated £4,000 to the establishment of the course and is committed, currently, for a further £2,000. Until, however, more details on progress of provision of facilities for practical work and set headquarters are given, the Institute has been notified that further money will not be forthcoming. An early reply to queries put to R.M.I.T. is expected and this will determine the further action to be taken. This may involve putting our position to the Minister of Education. I appreciate the co-operation of members of the Committee and of the Institute of Food Technologists in this matter.

Membership and Public Relations

Membership for the year has remained fairly static at 111 Full Mem-

— Continued on page 93



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STANDARDS

FROZEN BONELESS MEAT FOR EXPORT — CORRUGATED FIBREBOARD CONTAINERS

DRAFT AUSTRALIAN STANDARD

The Standards Association of Australia is seeking constructive comment and criticism on a draft Australian standard for corrugated fibreboard containers for frozen boneless meat for export, which is being issued as Doc. 884. The draft standard is complementary to A.S. N51, Solid Fibreboard Containers for Frozen Meat (for Export Purposes).

The provisions of the draft are based on the results of trial shipments of frozen boneless meat in solid packs up to 60 lb net weight. It is envisaged that the scope of the standard will eventually cover meat packs up to 100 lb net weight. This extension is contingent upon the satisfactory completion of further trials involving these weights.

The draft provides only for the overlap-slotted style of container. A maximum internal depth of 7 inches is specified.

Copies of Doc. 884 may be obtained from the Headquarters of the Association at 157 Gloucester Street, Sydney, or from branch offices in State capital cities and at Newcastle. Comment will be welcomed from manufacturers, suppliers and users of corrugated fibreboard containers for frozen meat. Such comment should reach the Association not later than 31st January, 1965.

ASSESSMENT OF PACKAGING ODOURS

B.S. 3755:1964 (5/9)

A major problem for paper and board makers and food manufacturers is the risk that packaging materials used for foodstuffs — paper, plastics, glass, foil and so on — will in some way taint the food. This can happen if the packaging material itself develops an odour as a result of close contact with the contents, or if it transfers an odour to the food product which

subsequently develops a taint or off-flavour.

It is obviously of importance to the packaging and foodstuffs industries to find out whether any taint will be produced during the shelf life of a package — whether the content is a cake mix, butter or icing sugar.

B.S. 3755 has been prepared to give guidance on this complex subject; it provides methods of test for the assessment of odour from packaging materials used for foodstuffs.

Recognition of odour or taint is a subjective process depending on human judgment, and the methods of test included in this standard call for a test panel. Guidance is given on the selection of personnel, test apparatus and materials, testing room, smelling and taint test procedures and the interpretation of results.

NEW SECTION OF BRITISH PACKAGING CODE FOR FILM WRAPPINGS

B.S. 1133: SECTION 21: 1964 (10/-)

There is now a great variety of end-uses in the packaging industry for transparent cellulose and plastics films and for various types of metal foil and flexible laminates. They may be found wrapping cigarettes, stockings or confectionery; protecting pre-packed fruit and vegetables, chemicals and sports goods; capping milk bottles; and providing packs for dehydrated soup powders or shampoos.

Detailed guidance on the different types now available, their properties and their suitability for particular applications is given in a new section of the British Standard *Packaging Code*, B.S. 1133.

Section 21 deals with *Transparent cellulose films, plastics films, metal foil and flexible laminates*. Some of these products were described briefly in Section 7 of the Code in 1952, but are now considered at

— Continued on page 93



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Ribotide "Takeda" is produced by enzymatic breakdown of yeast ribonucleic acid in a process developed in the research laboratories of Takeda Chemical Industries Ltd. Isolated to a high degree of purity, it is essentially a mixture (96 per cent by dry weight) of 5'-sodium inosinate and 5'-sodium guanylate.

Ribotide "Takeda" is an odourless white powder, readily soluble in water and highly stable under normal food processing conditions.

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CONFERENCES

MEAT RESEARCH CONFERENCE

The next meeting of International Institute of Refrigeration Commission 4 will take place May 19 to 21, 1965, in Karlsruhe, J. Kuprianoff to hold the meeting, at the Federal German Bundesforschungsanstalt für Lebensmittelfrischhaltung.

The following subjects are desirable to be discussed at the meeting:—

Prepacked Meat

Microbiology.

Technical problems and present status in certain regions regarding prepacked fresh meat.

Prepacked pasteurized meat products.

Poultry

Latest development in processing.
Meat texture.

Prepacked poultry meat.

Freezing of poultry.

Microbiology of poultry processing.

Egg

Evaluation of egg quality.

Influence of prepackaging on egg quality.

Preservation of egg quality.

Pasteurization of liquid egg products.

Miscellaneous questions

A very limited number of papers concerning subjects of particular interest, outside of the main topics listed above, may be accepted.

STANDARDS

much greater length in view of their importance. In indicating the properties and most usual end-uses for each type of material, Section 21 also describes methods of manufacture and provides a number of test methods for significant properties of cellulose film and metal foil.

INTERNATIONAL CONGRESS OF FOOD SCIENCE AND TECHNOLOGY

Progress in Food Science and Technology —
Key to Man's Future

The 2nd International Congress of Food Science and Technology will be held from 22nd-27th August, 1966 in Warsaw, Poland.

Plenary sessions will be devoted to lectures by prominent scientists. Other sessions will be devoted to discussions of topics of international interest, *i.e.*

New Protein Sources and Their Utilization.

Chemical and Biochemical Changes in Food.

Modern Technological Aspects of Food Processing, Manufacture and Preservation.

Advances in Food Engineering.
Technical Problems of Producing Wholesale Foods.

Assessment of Food quality.

Modern Trends in the Academic Training of Food Scientists and Technologists.

Economic, Nutritional and Sociological Aspects of Food Processing, Manufacture and Consumption.

Invited papers as well as freely contributed research papers will be selected for presentation at these sessions.

The official languages of the 2nd Congress will be: English, French, German and Russian. Simultaneous translation in English-Russian only will be provided for most of the sessions of the Congress.

F.T.A. OF VICTORIA

bers and 24 Associate Members. It is hoped, during the forthcoming year, to use the C.A.F.T.A. Public Relations Brochure, with our own insert detailing activities, to obtain an increase in membership. Our Public Relations Officer, during the year, initiated approximately thirty-five releases to Newspapers and Trade Journals and to Food Technology in Australia.

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SYDNEY, MELBOURNE, BRISBANE, ADELAIDE, PERTH, HOBART, LAUNCESTON.

CEREAL TECHNOLOGY

The Effect of a Steam Treatment on the Feeding Value of Wheat

The value of mildly steamed wheat in promoting the growth of the weanling rat has been compared with that of unheated wheat. Diets containing flour or wholemeal from the steamed wheat promoted a higher rate of growth and of food consumption than those containing corresponding materials from unheated wheat. By contrast, growth rate of food consumption were the same on diets containing steamed barley as on those containing unheated barley. Possible reasons for the improvement in feeding value obtained by steaming wheat are discussed and it is suggested that it may be due to the steaming process destroying the capacity of the wheat protein to form a cohesive gluten. (Authors' abstract.)

J. B. Hutchinson, T. Moran and J. Pace.
"J. Sci. Fd. Agric.", 15, 413, 1964.

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Aeration of Bulk Wheat Storages

The C.S.I.R.O. Division of Mechanical Engineering is investigating the effects of variations in temperature and moisture content on wheat in silos. New types of measuring instruments have been developed and one of these, a portable direct-reading thermocouple potentiometer, is now being made commercially.

It has been shown that wheat can be stored safely in bulk at relatively high moisture content if it is cooled by aeration with atmospheric air under proper control. Experimental aeration systems designed by the Division are under test in silos in Victoria.

Modified Starches

For many years a wide variety of unmodified and modified starches have been used to thicken and produce desirable textures in foods. In spite of wide usage, however, the American starch industry was obligated to establish the status of food starches under the *Food Additives Amendment*. The starch industry viewed both unmodified and modified starches as starches, and available technical information, as well as their long history of use, showed them to be safe. After reviewing the situation, F.D.A. officials decided only certain starches could be regarded by them as *generally recognized as safe (G.R.A.S.)* and therefore not food additives under the amendment. Most modified starches would have to be covered by food additive regulations.

On June 4, 1964, the F.D.A. issued a proposed regulation revision to the effect that the starches in question, to be called *food starch-modified*, may be safely used in food products. The regulation spells out specific treatments by which food starch may be modified. It may be thinned, thickened, bleached, oxidized, esterified, and etherified by treatment with named chemicals to specified extents. In addition, the regulation lists a number of reactants which may be safely used in the manufacture of industrial starches intended for use in food packages and packaging materials. These starches must be labelled *industrial starch-modified*.

What does the regulation add up to? That a wide variety of modified food starches have been recognized as safe, or shown to be safe, under the provisions of the Food Additives Amendment for use in processed foods. How such starches must be listed in ingredient statements has been clarified and simplified.

From "Corn", Vol. 20, No. 4.

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AUSTRALIAN NEWS

New A.P.M. Coated Carton Board

The first of a new range of high-quality, coated carton boards which Australian Paper Manufacturers Ltd. is now producing on its modern coating plant at Petrie in Queensland has been launched on the Australian market.

The new grades, which have the brand name of *Artcote*, will help Australian manufacturers achieve more attractive packaging for modern merchandising. They represent a new development in the technology and manufacture of coated paperboard in Australia.

The new Artcote boards are characterized by their fine white, high-gloss printing surface, combined with high rigidity and good folding properties. Artcote boards can be printed and folded on modern high-speed machines to produce top-quality cartons. They are designed to suit offset, gravure or letterpress printing processes.

All sheet orders are guillotined on four sides to ensure a clean edge and smooth feeding into carton machines and new wraps and labels have been designed for the grades.

Frozen Food Display Cabinets

After several meetings of a drafting sub-committee, a committee draft covering rating, construction, performance and testing of frozen food retail cabinets has been completed. In the course of this work consideration was given to several overseas standards including B.S. 3053 and ASA B38.3 and publications of the International Institute of Refrigeration and the Danish Academy for Technical Sciences.

The draft includes tests to measure frozen food product temperatures, energy consumption, moisture condensation and defrosting. In particular the draft requires that the design and performance be such that frozen food products are maintained at temperatures at or below 0°F.

Electronic Data Processing at Reckitt & Colman

The first electronic data processing system to be installed by a food processing and general manufacturing organization in Australia went into operation in Sydney, December 18.

The system, an IBM 1440 computer, was installed by Reckitt and Colman Pty. Limited.

The computer is now ready to produce correctly and quickly the analysis of sales which should prove to be a very valuable tool for the marketing teams. It is intended that this operation will be followed by computer invoicing, stock control and debtor and creditor procedures, in that order.

The machine will process invoices at the rate of 1200 a day, covering over 400 different packs of the Company's products, which include Reckitts Blue, Keens Mustard, Disprin, Dettol, Holbrooks Sauces, Planters Nuts, Bourne Floor Treatment products, and later it is hoped to include the Nugget, Meltonian and Goya products, which are at present produced in the Melbourne factories.

Recombined Milk Plants

In 1961, the Australian Dairy Produce Board began investigations into the possibility of developing markets in Asian countries as an outlet for dairy products. The decision was influenced by the application from the U.K. for membership of the European Economic

Community, the repercussion which such accession would have on the exports from Australia to those markets, and the fact that other nations similarly affected would probably look to Asia as an outlet for their surplus production.

Because of the statutory limitations of the A.D.P.B., a company, Asia Dairy Industries Ltd., was formed to act as the Board's and industry's agent, and it was decided to implement a programme for the establishment of recombined milk plants in suitable countries. The first plant was established in Manila and began operations in 1963. Plants have also been established in Bangkok and Singapore and are expected to commence production this year. All these have been afforded *pioneer status*, which covers a period of freedom from tax and entry of raw materials.

The establishment of these factories ensures that there will be an outlet for Australian-produced butteroil and powdered skim milk. It has been estimated that the combined requirements of these plants each year, when operating at full capacity, will approximate 6,500 tons of butteroil and 16,000 tons of powdered skim milk.

AUDIO-VISUAL TRAINING KIT FOR RETORT OPERATORS

The National Canners' Association of the United States of America has assembled an audio-visual teaching aid intended to assist canners in the training of retort operators. It covers the essential theoretical and practical aspects of the retort processing of canned foods and the potential hazards involved. The teaching aid presents this information in a simple, direct manner which may be readily understood by personnel not having special training.

The audio-visual kit comprises 71 2 in. x 2 in. colour slides and a 40 min. 3½ in. per sec. tape recording. In addition, the kit contains a dis-

cussion guide with a list of questions for the use of the instructor or discussion leader and a copy of N.C.A. Bulletins: 26-L "*Processes for Low-Acid Canned Foods in Metal Containers*"; 30-L "*Processes for Low-Acid Canned Foods in Glass Containers*"; and 32-L "*An Information Bulletin on Retort Operation*".

The C.S.I.R.O. Division of Food Preservation recently acquired one of these kits which may be borrowed by Australian canneries for short periods for training purposes. Arrangements for borrowing the kit should be made with:—

Miss B. Johnston, Librarian,
C.S.I.R.O. Division of Food Preservation,
Box 43, P.O., RYDE, N.S.W.

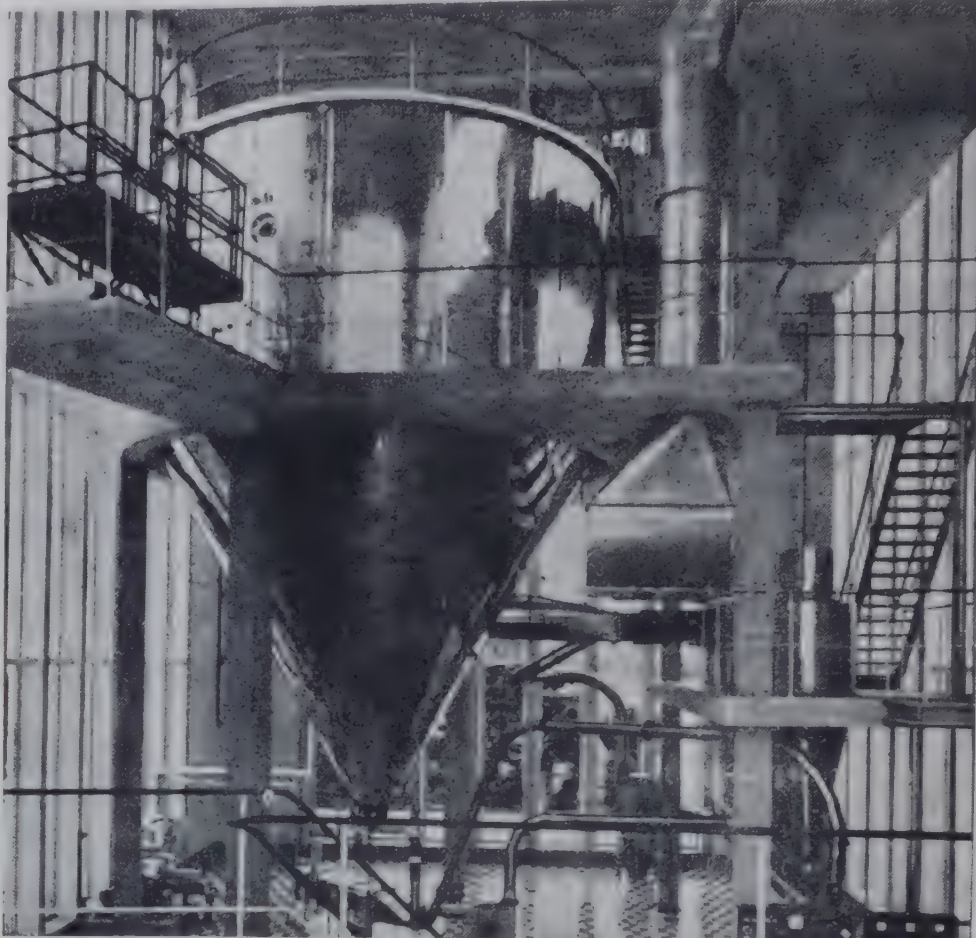
STRICTER FOOD LABELLING IN U.K.?

A report by the British Food Standards Committee published on September 10 (H.M.S.O.) calls for stricter requirements in the labelling of food.

It contains 72 conclusions or recommendations, among them that there should be:—

1. Specific provisions prescribing the size and location of the information to be printed on food labels;
2. Much stricter requirements for the declaration of chemical additives in food;
3. A large reduction in the exemptions from the present provisions which require the food label to declare the common or usual name of the food, a full list of its ingredients, and the name and address of the packer or labeller.

The committee also says that many cases of alleged misleading practices had been brought to their notice. Many of these were concerned with claims made for products and it was proposed to deal with them in a second report on claims made on labels and in advertisements. This is now being prepared.



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The Metal Container, as THEY See It

The Regulatory Official

(G. P. LARRICK)

The author, U.S. Commissioner of Food and Drugs, commends can-makers and canners alike on their record of producing billions of cans of safe, wholesome foods. He expresses concern, however, over hazards to the safety of canned foods which might arise from the use of new can making materials; abuse of containers from more rapid can handling and closing techniques; and sanitary conditions of canning equipment. He cautions against the lowering of production standards and inspectional safeguards, particularly in the self-manufacture of containers, and stresses the need for frequent and careful examinations of double seams. The Commissioner's fears regarding the safety of today's food containers are allayed in D. J. Wessel's paper, *"The Metal Food Container as the Container Supplier Sees it"*.

The Materials Supplier

(G. C. JENISON)

The tin plate producer supplies the canned food industry with an ever increasing variety of container materials. *"Such abundance is both a hazard and a great blessing: The knowledgeable can maker may engineer the container to fit the end product while the uninitiated may make some very costly mistakes"*. Areas of tin plate manufacture discussed include: composition of base steels; rolling and annealing practices; tin coating methods; chemical treatments to produce proper surface conditions; oiling; storage behaviour; and, corrosion resistance. The production of double reduced tin plate (2CR) is described separately.

The Container Supplier

(D. J. WESSEL)

Food containers made from double reduced tin plate (2CR) are as safe as other types of cans used in the past. Testing procedures used by container suppliers for determining the suitability of new materials and container performance are outlined. Can suppliers are responsible for manufacturing good quality containers from the most suitable combinations of materials, and for delivering damage-free containers to canning plants.

Obligations of the canner include:—

- adequate inspection of empty cans;

- proper maintenance of can handling equipment;

- elimination of line or warehouse abuse to filled and empty cans;

- formation of sound top double seams;

- adequate processing of the filled cans, and

- good plant sanitation.

The Packer

(W. J. HART, Jr.)

Problems encountered with lightweight tin plate and aluminium cans are discussed. Both can makers and canners share the responsibility to eliminate these problems. The canner has a right to expect that the can makers end of the container is sound and in all respects within specifications . . . The can manufacturer has to be sure that the lightweight plate and its enamel is suitable and satisfactory for the product which it is intended-

Report of a Symposium held at the National Canners' Association Annual Convention, 1964, as reported in the N.C.A. Convention Letter, 1959.

ed it will contain. He must segregate empty cans and lids made from this plate so that they will not inadvertently be mixed with cans and lids of regular weight plate. He must furnish the canner with proper seam specifications . . . and assure himself that the canner has the proper double seaming equipment to handle the special weight plate . . . The canner has the responsibility of checking the incoming shipments of containers and must maintain them in an orderly and sanitary condition. They should be cognizant of the closing machines they are using in relation to the tin plate weight and should be sure that the rolls are properly set for the type thickness of plate . . . All lines and equipment must be checked to be sure that rough handling is avoided. Areas of special care include empty can unscramblers, runways, elevators, and cable lines; loading and unloading of retort crates; labellers and case packers; case or carton sizes; palletizing; and warehousing practices.

EFFECT OF PICKING DATE ON THE QUALITY OF VALENCIA LATE ORANGE

A characteristic of the Valencia Late Orange is that its fruit may be left on the tree for several months after it reaches maturity in September, and changes of fruit quality during this extensive picking season have been investigated over three years, using selected trees on rough-lemon stock. It was found at the C.S.I.R.O. Irrigation Research Laboratory, Griffith, N.S.W., that throughout the whole harvest period, September to March, there was an increase in the sugar/acid ratio. Quality differences have been found between heavy- and light-cropping years; in the latter, fruit was heavier and sugar content was higher. Differences were also found in fruit from north and south sides of trees; those from the north had higher juice and sugar contents,

particularly at the beginning of the harvest period. Yield in terms of numbers of fruit was reduced during the long harvest period, but the weight of individual fruit increased, so that the yield in March was similar or even higher than in October, despite pre-harvest drop. The thickness and peel weight of fruit decreased during the harvest period, apart from an increase near the end.

Collaboration has continued with C.S.I.R.O. Division of Food Preservation on the study of juice bitterness. Fruit has been picked fortnightly from trees selected to show the influence of rootstock, scion and fertilizer treatment.

From the Annual Report 1963-64, C.S.I.R.O. Irrigation Research Laboratory, Griffith, N.S.W.

ORIGIN OF METHANOL AND DIMETHYL SULPHIDE FROM COOKED FOODS

Methanol and dimethyl sulphide are produced from vegetables on cooking. This must be by some system that is not present in instant coffee powder which yields no methanol and only small amounts of dimethyl sulphide.

Results of investigations suggest that the methanol produced arises from the non-enzymatic hydrolysis of pectin. It has been shown that heating methionine and purified pectin at 212°F in buffer solutions (pH 6.5) at concentrations of 1.5 mg/ml produces quantities of dimethyl sulphide together with other compounds of the same order as obtained from certain cooked vegetables.

This reaction would therefore seem to account for part, at least, of the dimethyl sulphide, and this may be of importance in enhancing the flavour of manufactured foods.

J. C. Casey, R. Self and T. Swain. "Nature". 200, 885, 1963.

MICROBIOLOGY

A Consideration of the Microbiology of Frozen Foods

Results of a market survey which has been carried out on various types of pre-cooked frozen foods, are given in a paper by M. F. Gunderson and A. C. Peterson in the "Assn. of Food and Drug Officials of the United States Quart. Bull", (January, 1964). Bacterial counts for the various varieties are presented in tabulated form. The ecology of frozen foods in retail cabinets is considered and methods for the prevention of bacterial growth discussed.

Edinburgh Paratyphoid Outbreak

The report is now available of the investigation into the outbreak of paratyphoid which occurred in Edinburgh in the first few months of 1963 and affected 188 persons, 165 from the city.

Suspicion attached to cream trifles, used for a children's party, although during the same weekend, the bakery concerned made 800 such trifles. The organism responsible was *Salm. paratyphi* B, phage type Taunton. Samples of raw materials and equipment at the bakery were negative, but imported Chinese egg appears to have been the vehicle, reports the "British Food Journal" (July, 1964).

The article closes with the statement that "Steps taken to reduce risks with egg albumen and desiccated coconut and the Liquid Egg (Pasteurization) Regulations, which came into force on January 1, 1964, should do much to prevent outbreaks of paratyphoid of this kind".

F.H.R.

Food Micro-Organisms Influencing the Growth of Staphylococcus Aureus

Some 870 cultures of predominating micro-organisms were isolated from market samples of hamburger, fresh pork sausage, fresh fish fillets, stewing beef, frozen chicken pot pie, frozen corn, frozen peas, and pasteurized and raw milk, before and after storage at different temperatures. The isolates were screened for their ability to influence the growth of *Staphylococcus aureus* strain 196E by means of spot-plate tests on APT and nutrient agars at 77°F. Pork sausage had the highest proportion of inhibitory cultures, and stewing beef had the lowest. Most of the lactic acid bacteria were inhibitory, but other groups of bacteria contained more stimulatory cultures than inhibitory ones. The three *E. coli* cultures were stimulatory, but most other *Escherichia* cultures were inhibitory. *Aerobacter* and *Paracolobactrun* isolates were most stimulatory.

R. R. Graves and W. C. Frazier. "Applied Microbiology", 11, 513, 1968.

Comment on the Hydrogen Peroxide-Catalase Treatment of Milk for Cheese Manufacture

It is now necessary to pasteurize milk for cheese making, to meet stricter public health standards. Cheese manufacturers point out that cheese made from pasteurized milk matures more slowly and less fully than that from raw milk or less severely heat treated milk. To meet these objections in U.S.A. the alternative hydrogen peroxide-catalase treatment is permitted. A paper by Barbara P. Keogh in the "Aust. J. Dairy Technol." (19: 86, 1964) examines the possible use of this procedure in the Australian cheese industry.

NUTRITIONAL ASPECTS OF WHEAT PROTEIN

The results of some experiments on rats at the Research Association of British Flour Millers are discussed in "Milling" (143 (i), 9, 1964). When the growth rate of weanling rats is used as a yardstick, the nutritive value of wheat protein is limited by a deficiency of lysine but when this is made good, future improvement is limited by the threonine content. The low lysine content of white bread may be corrected by the inclusion of lysine. Such inclusion retards gas production and improves crust colour. About 10 per cent of the lysine that is in the crust is, however, rendered non-available.

NON-CALORIC SWEETENER HAS UNIQUE PROPERTIES

Cyclohexysulphamic acid is now commercially available in the United States for use as a non-caloric sweetener, known as *hexamic acid*, in low-caloric foods and beverages. In distilled water, it is about 27 times sweeter than sucrose. When first tasted it is sour or tart, but the buffering action of the saliva produces a sweet taste. Tartness and sweetness of the agent vary with the products and flavours with which it is used. It is considered GRAS when used as a non-nutritive sweetener in amounts equivalent to the sodium and calcium salts of the acid.

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BOOK REVIEWS

● "MEAT HYGIENE".

Current emphasis on the introduction and maintenance of strict hygiene in Australian slaughterhouses and meatworks concerned with the preparation of boneless beef for export to the U.S.A. makes the Second Report of the Joint F.A.O./W.H.O. Committee on Meat Hygiene* of particular interest at the present time. This comprehensive report merits attention by all concerned in the handling and processing of meat, and rightly stresses the need for strict enforcement of adequate measures covering hygienic handling of animals from the farm and of meat through the abattoir and until it is consumed.

The report contains sections dealing with principles and objectives of meat hygiene; types of control which should be exercised; the classification of the principal diseases caused by meats; pre-abattoir handling of livestock; the design, construction, and operation of abattoirs; the inspection of meats, their manufacture, and their transport; the sanitation of retail shops and of bulk feeding kitchens; laboratory services and methods; establishment of standards for processed meats; the hygiene of meat handlers; special problems of meat hygiene; and new developments. To round off its report the Committee has listed problems which merit further investigation, including those concerning manufactured meats, where there are ample opportunities for bacterial growth if vigilance is relaxed.

In recognition of the rapid growth in many countries of the poultry industry, a special section has been devoted to the subject. In it the Committee suggests that the use now being made of dehydrated poultry products justifies extensive bacteriological studies.

Wherever it appeared desirable, the Committee has expressed opinions on vexed questions; for instance it considers that pending further investigations, the feeding of hormones to meat animals should be abolished or at least limited to preparations which are rapidly eliminated from the body.

The annexes to this very readable report include data relevant to its contents, the design of abattoirs, outlines of inspection procedures, regulations of various kinds, and a great deal of other information of value to the meat handler and processor. For a publication of some 90 pages, moderately priced at 5s. sterling, the report is surprisingly comprehensive in coverage. Those engaged in the management of abattoirs and meatworks would be well advised to read it and to make copies available to members of their supervisory staffs.

H.H.

*Joint F.A.O./W.H.O. Committee on Meat Hygiene (1962) Second Report (Wld. Hlth. Org. Tech. Rep. Ser. 241: F.A.O. Agricultural Studies No. 58). (Price: 6s. 9d. post free).

From "Food Pres. Quart."

- "COFFEE PROCESSING TECHNOLOGY", by M. SIVETZ & H. E. FOOTE, *Avi Publishing Company, Westport, Conn.*, 1963. Vol. I, 598 pages, \$18.25. Vol. II, 380 pages, \$13.50.

In these two volumes is attempted a complete review of the coffee processing industry. The authors are chemical engineers, and the text reflects both their professional status and wide experience in the industry.

Volume I — Fruit-Green, Roast & Soluble Coffee

This volume commences with a resume of the history of coffee with particular emphasis on the last decade, and a brief glance at its horticulture. Then follows a section on



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KRAFT

INDUSTRIAL DIVISION

*Reg'd. Trade Marks.

the preparation of green coffee with chapters covering harvesting, depulping, drying and hulling. Next is considered the classification, storage and transportation of the green coffee, and the roasting and grinding processes.

A large proportion of the world's coffee goes to the consumer in this form, the remainder being processed into soluble (*i.e.* "instant") coffee. As this section of the industry is growing rapidly and because of its complexity and sophistication, the manufacture of soluble coffee is the major concern of the authors.

Thus there follows several chapters giving extensive and detailed studies of the processes of percolation and spray drying. The volume concludes with a lengthy chapter on the packaging of both roast and soluble coffee.

*Volume II — Aromatization-
Properties-Decaffeination
Brewing Plant Design*

This opens with a detailed study of the problems and techniques of the aromatization of soluble coffee. Then is discussed, very ably, the physiological and psychological effects of coffee — as coffee is not bought for nutrition but for the pleasure and satisfaction it affords through flavour, aroma, *etc.* this is the most important aspect of any coffee product. Chapters on the physical and chemical properties of coffee are followed by discussion on the control of both the processing and product quality of soluble coffee.

In the section on "*Special Aspects of Coffee Processing*", decaffeination, brew preparation in the home, restaurant and vending machine are described.

The volume concludes with an extensive study on soluble coffee plant design.

The material is well organised, the style lucid and each chapter is supported by extensive bibliographic and patent references many of which are as recent as 1963.

The authors state their purpose was "*to provide the reader with a*

central source of historical, currently practical and theoretical information on coffee processing", and in this aim they have succeeded admirably.

The volumes will prove invaluable to all those engaged in any facet of the coffee processing industry.

Reviewer: J. G. Harris, *The Nestlé Co. (Australia) Ltd.*, Sydney.

- "CAROTENES AND CAROTEN-
OIDS" (*Carotine und Carotin-
oide*). Lectures and discussions
of a symposium held in Mainz
from 24 October, 1961. K. LANG
(Ed.). Scientific Publications of
the German Nutrition Society,
No. 9. 411 pages. Dr. Dietrich
Steinkopff, Darmstadt, 1963. D.M.
68.00.

These are the Proceedings of a very comprehensive three day symposium on carotenes and carotenoids including vitamin A and compounds with vitamin A activity organized by the German Nutrition Society. They are very comprehensive indeed and each aspect of the topic is presented by the appropriate expert. As one would expect members of the Hoffmann-La Roche organization occupy a prominent place in the team of contributors.

The twenty-seven papers deal with these aspects of carotenoids: distribution in nature and biological significance, biogenesis, synthesis, analytical procedures, metabolism in man and animal, significance of carotenoids for avians, stability in food, and the legal position when employed as food colours. Each contribution has its own bibliography and is followed by a brief account of the discussion that went with it.

Five papers are in English, one in French and the rest in German. The production of the book is of the best quality and the structural formulae a joy to behold.

A most valuable contribution to the literature of the carotenoids, incl. and vitamin A and a fund of information on their literature.

F.H.R.

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- "THE DETECTION AND DETERMINATION OF ANTIOXIDANTS IN FOOD". *Special Report No. 1, 27 pages, published by the Association of Public Analysts, London, 1963, 10/-.* Orders should be sent to R. C. Spalding, Hon. Treasurer, Association of Public Analysts, County Hall, Maidstone, Kent.

Following the issuing of the British Colouring Matters in Food Regulations, 1957, the Association of Public Analysts had felt the need for a simple workable scheme for the identification of the permitted colours. This led to the publication by the Association of a monograph on the *Separation and Identification of Food Colours*. The passing of the *Antioxidant in Food Regulation*, in 1958, posed a similar problem, and the Association now has published this report.

Analysts will find it especially valuable that the authors have included details of analytical procedures and the results of collaborative trials giving the assurance that the methods described have actually been tried out.

F.H.R.

- "FOOD TECHNOLOGY THE WORLD OVER", Volume 1. By M. S. PETERSON and D. K. TRESSLER (Eds.). 540 pages. Avi Publishing Company. Westport, Conn. 1963. \$15.00.

This is the first of two volumes surveying developments and achievements in food technology in various countries. Volume I deals with ten of the more highly industrialized countries, whereas Volume 2 will refer to nations where production and manufacture are at present less highly mechanized.

The present volume comprises twelve chapters of which the first two provide a general statement on world food statistics and on the role of engineering inventions and science in the growth of modern

food technology. The remaining ten chapters have been contributed by over twenty authors, most of whom are residents of the countries which they discuss.

The countries whose technologies are discussed in this volume include seven from Europe (Denmark, France, West Germany, Netherlands, Sweden, United Kingdom and U.S.S.R.), Canada, United States of America and Australia. The chapters vary widely in size and method of treatment, the shortest (12 pages) being those for West Germany and the Netherlands, whereas the largest are those on U.S.S.R. and Australia (84 and 94 pages respectively).

Each chapter reflects the present state of technology in the various branches of the food industry of the particular country, together with some references to relevant sources of information. Several of the chapters manage also to portray something of the character of the nation. The chapter on Sweden, for example, has been done with characteristic thoroughness by nine separate authors. The French authors have featured fine cookery, wines, cognac and delicacies such as foie gras and snails, while the contribution from the United Kingdom emphasizes food supplies, exports and research. The U.S.S.R. is observed through United States eyes. Australian readers will be impressed by the detailed account which Professor F. H. Reuter has given of the present level of technology in the Australian food industry.

As a source of interesting reading the book will find a place in many departmental libraries. It is less likely to be an authoritative source of information about developments in food technology in different countries.

Reviewer: Dr. W. J. Scott, C.S.I.R.O. Division of Food Preservation, Ryde, N.S.W.

- "MEAT TECHNOLOGY" — A *Practical Textbook for Student and Butcher* by FRANK GERARD. 3rd Edition. 352 pages. Leonard Hill Books Ltd., London, 1964. £1.15.0.

The first edition of this book was published in 1945 and dealt with the handling and preparation of meat. Starting with the live animal, the sequence of operations continued through to variations of meat cuts by the butchering trade in the U.K. The third edition follows a similar pattern but has been lengthened by fifty pages and includes an appendix giving information for students concerning the various proficiency certificates associated with Meat Technology.

Fifteen out of the nineteen chapters in this book are devoted to the three main types of meat producing animals; Cattle, Sheep and Pigs. In each case a start is made with the evolution of the species and different breeds, their anatomy, various organs and nomenclature then proceeding to slaughter and abattoir operations, evaluation of carcass quality and dressing percentages. The important phase of cutting up the carcass is dealt with in a chapter covering fifty-four pages and includes calculations, tests and comparisons of home killed against imported carcasses.

The author has succeeded in conveying with the aid of diagrams, photographs, tables, graphs and a concise text, much basic and essential information which, besides being of value to the student and butcher, can also be of use to the Exporter of Meat to the U.K., particularly the terminology and description of wholesale cuts.

It is disappointing to find only a brief outline of the Canpak System of Dressing Beef on the Rail and no mention about export meat to the American Market. A number of Australian Meat Works have already installed the Canpak System as there are many advantages over the older methods of carrying out some of the operations on the floor of

the abattoir. The export of various grades of meat cuts, mainly in boneless form to the American Market is of considerable importance to the Australian Exporter. The different varieties of cuts, rigid specifications, strict hygiene and other factors has meant the development of a different technique in the handling and preparation of meat. Perhaps a future edition will make provision for developments taking place outside the U.K. and so widen the scope of the book.

Reviewer: A. Dinwoodie, W. Angliss & Co. (Aust.) Pty. Ltd., Sydney.

- "THE REFINING OF FATS AND EDIBLE OILS" (*Die Raddination von Fetten und Fetten Olen*). By R. LUDE. 2nd edition. 312 pages. Theodor Steinkopff, Dresden, 1962. D.M.22.60.

This second edition follows five years after the first one which was reviewed in this Journal, vol. 11, p. 38, 1959.

The changes in the text are insignificant. Judging from the virtual absence of references, the author appears to have noted no progress in the science and technology of fat refining during the period between the two editions.

— F.H.R.

DRIED EGG — NEW USES

Egg solids containing less than 2 per cent sodium silico-aluminate as an anticaking agent have been approved by the U.S. Food & Drug Administration for use in mayonnaise, salad dressing and french dressing. The free flowing solids are less wasteful than frozen egg, which has to be scraped out of the container. They have a lower bacterial content and can be more uniform in quality because they are produced in large batches.

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"CHLORINATION OF WATER"

The National Cannery Association have produced two important summaries of information on the chlorination of water intended for use in canneries. The first deals with the physical and chemical aspects of chlorination, and considers the subject in detail under such headings as Chlorine compounds; Explanation of terms; Germicidal action and Controlled application. The operation of inplant chlorination is explained at length, and useful tables quote the effect of chlorine on the flavour of canned fruits and vegetables, and its corrosive effect on various materials. Calculation of chlorine dosage, and methods of testing for chlorine concentration are fully explained.

The second summary deals with factors which affect the germicidal activity of chlorine compounds. Consideration is given to the mechanism of bacterial cell inactivation by chlorine compounds, and to factors such as pH of the chlorine solution, and the presence of organic matter, which greatly affect germicidal action. Graphs illustrate the effect of these factors.

"F.A.O. REPORT"

Summary Report of the F.A.O./U.N.I.C.E.F. Meeting with the Food Industries on Protein-Rich Foods for Developing Areas, Rome, 21-25 October, 1963. 4 pages.

Report of the F.A.O./U.N.I.C.E.F. Meeting with the Food Industries on Protein-Rich Foods for Developing Areas, Rome, 21-25 October, 1963. 19 pages.

Report on the Meeting of an Expert Panel on Fish Meal and Fish Flour for Human Consumption held in Washington, D.C., 28 and 29 September, 1961. 17 pages. F.A.O. Fisheries Reports No. 2.

"REPORT OF SECOND NATIONAL CONFERENCE ON WHEAT UTILIZATION RESEARCH"

Sponsored by National Association of Wheat Growers; Great Plains Wheat, Inc.; Western Wheat Associates, Inc.; Western and Northern Utilization Research and Development Divisions and other agencies of the U.S. Department of Agriculture at Peoria, Ill., October 28-30, 1963. 247 pages. Northern Utilization Research Development Division, Agricultural Research Service, U.S. Department of Agriculture, Washington D.C., 1964.

This report contains either the complete text or summaries of all talks that were given. The conference provided a common meeting ground where various groups interested in wheat utilization presented information to promote the wider use of wheat and wheat products. General areas covered by one or more presentations included programming of research on grain and industrial utilization; economics of domestic and foreign markets for wheat and wheat products; wheat and flour quality evaluation, microbiology, and radionuclide content, improvements in processing wheat grain, flour, and starch by conditioning, air classification, chemical and enzymatic modification, and radiation sterilization; effects of treatments on chemical constituents, physical properties, and nutritive value; and development of new or improved wheat-based foods.

"TAINTING OF CANNED AND QUICK FROZEN FRUIT AND VEGETABLES"

By V. D. Arthey and W. B. Adam. Technical Bulletin No. 8. Fruit and Vegetable Canning and Quick Freezing Research Association. Chipping Campden, Glos., U.K. 1963.

"INDUSTRIAL FISHERY TECHNOLOGY"

By M. E. Stansby (Ed.). 393 pages. Reinhold Publishing Corp., New York, 1963. \$12.00.

This book is written by a group of specialists in the commercial fishery operations field to give readers a wide range of pertinent, up-to-date knowledge. The text emphasizes commercial aspects with incidental mention to research and research findings. The book is fully referenced and includes a special bibliographical reference section. *Part I*: Characteristics of fish, conservation statistical data on U.S. fisheries, and harvesting methods. *Part II*: Description of major fisheries in the United States, and 11 chapters of thorough descriptions of fish species. This section covers the leading 16 species in the United States (by value), plus other types including marine mammals, e.g., seals and whales. *Part III*: By-products of fisheries, mainly production of oil and fish meal. Three chapters show how these by-products are processed, describe their properties and uses. Chapters on animal feed and industrial products prepared from fish are also included. *Part IV*: An all-inclusive survey of preservation methods employed by U.S. commercial fisheries. *Part V*: A study of how such sciences as chemistry and microbiology are used in fishery technology. The subject matter is concerned with chemical composition, nutritive value, spoilage, analytical methods, etc.

From "F.A.O. World Fish Abstr.", 15, 35, 1964.

"Physical and Chemical Factors Affecting the Efficiency of Washing Sweet Corn"

By J. R. Geisman and W. A. Gould. Ohio State Agricultural Experiment Station. Ohio. 1963.

"COLOR: A GUIDE TO BASIC FACTS AND CONCEPTS"

By R. W. Burnham and others. 249 pages. New York, Wiley, 1963.

"FRUIT"

A review of production and trade relating to fresh, canned, frozen and dried fruit, fruit juices and wine, compiled in the Intelligence Branch of the Commonwealth Economic Committee. 232 pages. H.M. Stationery Office, London. 10s.

Canned Fruit. Further expansion in world canned fruit production brought total packs in 1962 to nearly 3.5 million tons, of which Commonwealth producers accounted for 13 per cent and the United States for 60 per cent. World trade rose by 100,000 tons in 1962, reaching a total of 950,000 tons, which included record shipments from numerous countries, among them the United States, Australia, Taiwan, Spain, Italy and Kenya. United Kingdom imports in 1962 were at the unprecedented level of 356,000 tons, of which 37 per cent came from Commonwealth sources; substantial stocks held at the end of the year weakened the market in the following year, and 1963 imports fell back to 338,000 tons.

Dried Fruit. The 1962 world output of dried vine fruit was again above average, with heavy packs in Australia, Greece and Turkey, although lighter production in California and Iran brought some reduction in the total supplies compared with the previous year. World trade in dried vine fruit in 1962 was at a record level, exports totalling 394,000 tons. Prospect of continuing heavy supplies led to an agreement in June, 1963 between Australia, Greece and Turkey on minimum export prices, but in the event 1963 output was considerably lighter. United Kingdom imports of dried vine fruit totalled 130,000 tons in 1962 and 120,000 tons in 1963.

"CHEMICAL METHODS FOR ANALYSIS OF FRUIT AND VEGETABLE PRODUCTS"

By J. A. Ruck. 47 pages (loose leaf ring binder). Publication 1154. Canada Department of Agriculture. Ottawa. 1963.

"VEGETABLE OILS AND OILSEEDS"

A review of production, trade, utilization and prices relating to groundnuts, cottonseed, linseed, soya beans, coconut and oil palm products, olive oil and other oilseeds and oils. 262 pages. Compiled in the Intelligence Branch, Commonwealth Economic Committee. H.M. Stationery Office. London. 1964. 10s.

Indications for 1964 include a recovery in world edible oil supplies, due to a record olive oil output and increased amounts of groundnut and soya oil, while in the edible-industrial group supplies are likely to be well maintained.

Appendices in "Vegetable Oils and Oilseeds" deal with the European Economic Community (including details of imports in 1963 and 1962); the tariffs and trade regulations of leading importing countries; annual available supplies of vegetable oils in various countries; soap, margarine and compound cooking fat production; whale oil production and trade; and oilcake production, trade and prices.

"SULPHUR DIOXIDE PRESERVATION OF FRUITS"

31 pages. (CDA Publication 1176.) Information Division, Canada Department of Agriculture, Ottawa. 1963. \$0.50.

This booklet by F. E. Atkinson and C. C. Strachan of the Research Station, Summerland, British Columbia, gives information on the use of sulphur dioxide as a temporary preservative for cherries to be processed into bakery fruit and maraschinos, and for fruit pulps (strawberries, raspberries, black currants and zucca melon) for re-manufacture into jam

"A Survey of pH Variation in Canning Tomatoes"

By R. P. Farrow, National Cannery Association, Washington, D.C. January, 1963.

"A CONCISE GUIDE TO PLASTICS"

By H. R. Simonds and J. M. Church, 2nd Ed. Reinhold Publishing Corp., New York. 1963.

This edition covers some of the newer plastics: polypropylene, polycarbonate, chlorinated polyether and acetal resins. Newly developed processes treated include fluidized-bed process, blow moulding, extrusion moulding, one-shot foaming system, and the development of stereo-ordered polymers. New subjects added to the already broad scope of the first edition include basic chemistry, manufacturing techniques, stereospecific catalysts, ablative action, borderline materials, and the plastics business.

"FISH SMOKING"

A Torry kiln operator's handbook, 44 pages. Department of Scientific & Industrial Research. Torry Research Station, London, 1963.

"HANDBOOK OF ADHESIVES"

By Irving Skeist (Ed.). Reinhold Pub. Corp., New York. 1962.

More than 50 authors, each an expert in his field, provide essential information on the chemistry, manufacture, and application of both natural and synthetic adhesives. The first section, defines terms and presents basic information on adhesives properties, specifications, testing, and designing. The next section takes up each adhesive specifically and gives its chemistry, production, formulation and uses in various end products. It also critically examines the new adhesives. In the third section the authors discuss adhesion problems from the point of view of the material to be bonded.

"PROPERTIES AND TESTING OF PLASTICS MATERIALS"

2nd edition. By A. E. Lever and J. Rhys. 321 pages. Temple Press. London. 1962.

DISINFECTION OF HANDS : REMOVAL OF TRANSIENT ORGANISMS

Previous work has shown that the numbers of resident skin bacteria on the hands are considerably reduced by treatment with certain antiseptics but virtually unaffected by washing or scrubbing for the same time with soap and water.

In contrast, transient bacteria (represented in the present study by cultures of bacteria inoculated on the skin) were almost completely removed either by rinsing with antiseptics or by washing with soap and water; there was little advantage in the use of antiseptics against these organisms, and neither rinsing with hypochlorite solution nor washing with *hexachlorophane detergent cream* had much advantage over physical ablu-

tion in removing them. Although the great majority of these inoculated transient organisms were removed by washing with soap and water, some of them persisted even after treatment with antiseptic solutions and more effective removal seemed possible, either by ablation or disinfection, from hands wearing gloves than from the bare skin.

The application of an antiseptic which remains on the skin may have some value in preventing the survival or multiplication of bacteria that are subsequently deposited on the skin.

E. J. L. Lowbury, H. A. Lilly and J. P. Bull. "Brit. Med. J.", 1964, 2, July 25, 230-233

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MEAT TECHNOLOGY

Sausage Colour

Commercial frankfurters were examined spectrophotometrically and found to vary in total meat pigment content and the extent of conversion to cured pigment. Approximately 86-93 per cent of the total pigments in the commercial frankfurters were found to have reacted to form nitric oxide myochromogen.

Similar variations were observed in frankfurters prepared in the laboratory from different meat formulations. In a controlled atmosphere, the rate and extent of cured-meat pigment formed was dependent upon the time and temperature at which the frankfurters were processed. Cured colour developed more rapidly in frankfurters heated at 210°F than at 170°F.

Frankfurters processed with steam differed considerably in surface colour from frankfurters produced by the conventional smoke or hot-air process. The use of a vacuum on the emulsion prior to heating markedly accelerated colour development.

“Food Technology”, 17, 105, 1963.



Meat Content of Canned Ravioli

The Food Standards Committee of the U.K. Ministry of Agriculture, Fisheries and Food report of 1962 suggests that canned meat with pastry should contain not less than 45 per cent meat. T. McLachlan (“Food Processing and Packaging”, 32, 287, 1963) does not think that this standard was intended to refer to a product such as canned ravioli. However, exception to this was taken and this series of determinations was made to put the meat content

of canned ravioli as sold now in London on record.

Analyses showed that the meat content averaged 5.8 per cent, but if the figures were adjusted to an assumed water content of 29 per cent of the paste the range became 18-29 per cent meat. Thus if the meat content is to be based on a figure from the original raw ravioli with 29-30 per cent water in the pasta a figure of 25-30 per cent of raw meat should be adopted, but if the figure is based on the contents of the can as sold a figure of 8.9 per cent should be used.



Watery Pork — Symptoms and Causes

Bendall and Lawrie of the Low Temperature Research Station, University of Cambridge, in Station Memorandum No. 245 conclude that wateriness in muscle post-rigor may be caused by several distinct conditions, such as vitamin E deficiency and muscular dystrophy, but these do not seem to play a part in the phenomenon as observed in Danish and English Landrace pigs.

It can be shown that rigor occurring at high temperature (37°-40°C) will invariably produce watery and pale muscle, through denaturation of the muscle proteins; not only in pigs but in beef, rabbit and whale as well. These conditions exist on pig slaughtering lines, if the fall of pH after death and the onset of rigor are sufficiently rapid. Such rates of pH fall are actually observed in the muscles of Danish Landrace pigs.

In English Landrace pigs it is possible that the above factors also operate to bring about wateriness in those cases where the ultimate pH of the muscle is normal at about pH 5.4, but the exceptionally low ultimate pH values, below pH 5.0, which are occasionally encountered would bring about denaturation of the muscle proteins, without the temperature of the carcass necessarily being very high. No pathological features were found in

the condition described. Breeding for rapid weight gain has probably contributed to the phenomenon.

●

Flavour of Beef and Whale Meat

Previous studies by I. Hornstein, P. F. Crowe and W. L. Sulzbacher of the Meat Laboratory, U.S. Department of Agriculture, Beltsville, Md., had led to the conclusion that an identical basic meaty aroma is associated with the lean portion of red meats (beef, pork and lamb) and that the species flavour differences reside in the fact. A study reported in "*Nature*" (199, 1252, 1963) compares the volatiles, chemically and organoleptically, of lean whale and beef meats as a check on the above conclusions.

The procedures previously used to concentrate flavour precursors in lean meats ["cf. *J. Agricultural and Food Chemistry*", 8, 65, 494 (1960) and 11, 147 (1963)] were applied to lean whale meat. The resulting broth was rated excellent by odour evaluation and was described as *meaty*. Chemical comparisons were made on freeze-dried extracts of the lean meats. The aroma of the fractions from whale were identical to their counterpart fractions from beef. Thus this study confirms the conclusion that a basic meat flavour originates in the lean portions of meat.

●

Compact Vertical Beef Dressing System

Up to 25 beasts per hour can be dressed by 14 operators at a new slaughterhouse in the North of England, where carcasses are suspended vertically from rails throughout the entire process. This version of vertical dressing is the first working plant of its kind in the U.K., and was designed by *Iwel Engineering Limited* of 7/11, Old Bailey, London, E.C.4. Since the men stand upright while they work, backaching fatigue is eliminated, and because the carcasses are kept clear of the ground,

there are considerable hygienic advantages.

The equipment is simple and is intended for newly constructed slaughterhouses, but it is possible to use it in a programme of modernization. There are three systems of rails along which the beasts are conveyed manually, and the transfer of carcasses from one set of rails to another is done by powered hoists. With six operators — the minimum recommended number — at least ten beasts per hour can be handled. The system has been given the approval of Britain's Ministry of Agriculture, Fisheries and Food.

●

Irradiation of Meat

A review of the results of meat irradiation investigations leads to the conclusion that radiation sterilization is not expected to be of significance for meat preservation for civilian use in the immediate future. Radiation pasteurization is more promising, particularly where a modest increase in the refrigerated shelf life is of value.

J. J. Macfarlane, "*C.S.I.R.O. Food Pres. Quart.*", (23, 65, 1963).

●

Biochemical Factors of Meat Quality

For beef processing and for the production of sausages, the usual features of meat quality such as tenderness and colour are of much less importance than the water holding capacity and the ability of emulsifying fat, about which only little information exists.

The following *before-processing* factors are significant for the manufacture of a good sausage, Frankfurter type: —

the selection of the meat with regard to age and sex of animal;
in the case of the use of frozen meat, application of optimum methods of chilling and thawing;
time after slaughter and favourable effect of using hot meat;
effect of pH, favourable effect of high pH.

It has to be mentioned, however, that an increase of pH is not of advantage in all cases since it usually enhances the danger of bacterial spoilage.

As to the production of dry sausages, one of the most important phases is the *pre-drying* process. Though it is to be expected that weight losses during storage increase with decreasing water holding capacity of the beef, the rate of drying is influenced by the strong effect of the relatively high salt concentration on the water holding capacity of beef. At great salt concentrations, osmotic processes are apparently the decisive factor for the extent of evaporation loss. Of course, not only the meat factors but also the processing conditions such as grinding, salting, curing, heating, etc., have a strong influence on the quality of beef sausages.

R. Hamm, "Fleischwirtschaft", 44, 9, 1964.

•

Enzyme Paper for Tenderizing Meat

The Crown Zellerbach Corporation is reported to have developed an enzyme-treated paper to wrap cuts of meat and tenderize them. The moisture in the meat activates the chemical, uniformly tenderizing it and eliminating the danger of over-tenderizing, it is stated.

The paper is said to tenderize steaks for about one-half cent per lb.

•

Indices of Meatiness in Beef

Literature on methods of evaluating carcass composition is reviewed in "Missouri University, Research Bulletin" 820 (55 pages, 1963). An investigation is described in which it was demonstrated that the ultrasonic technique is an accurate method of measuring ribeye area and fat thickness in live cattle. Ultrasonic estimates were significantly related to actual measurement in the carcass.

PERSONAL

Mr. C. E. C. Sawkins, Manager Quality Control & Research, H. J. Heinz Co. Pty. Ltd., Dandenong, Vic., left recently to attend an international research conference of the Heinz Company in Washington D.C., U.S.A. The conference has as its theme "*The Role of Research in Company Growth and Development*".

Mr. Sawkins will spend some time at Heinz Company research centres in Pittsburgh Pa. and Leamington, Canada. He will also visit the U.K. to study recent advances in food processing.

As Chairman of the Australian Southern Section of the Institute of Food Technologists, Mr. Sawkins also hopes to evaluate the status of food technologists in the countries he visits during his 10 week world trip.

U.S. GRANT

The Charles F. Kettering Foundation of Dayton, Ohio, has made a grant of £14,000 dollars to Dr. R. M. Smillie, leader of the Plant Physiology Unit of the Division of Food Preservation, in support of his research on photosynthesis in plants.

This is the second grant Dr. Smillie has received from the Kettering Foundation; in 1963 he was given 18,500 dollars.

Both grants have been used to purchase equipment, including a Chance dual-wave spectrophotometer which can measure very small spectral changes in chloroplasts.

I go on working for the same reason that a hen goes on laying eggs.

— H. L. Mencken

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— A. L. Bacharach



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FLAVOUR NUCLEOTIDES

5'-Nucleotides and their combinations with MSG are now reforming Japanese food practices. As the processes for their production continues to be improved they are expected to attain world-wide recognition as new excellent flavour enhancers. It also appears that improved availability of these compounds will stimulate the development of many other uses of interest to food technologists, nutritionists, and physiologists, believe A. Kuninaka, M. Kibi and K. Sakaguchi in a historical survey in "Food Technology" (March, 1964).

The results of an investigation of the natural distribution of nucleotides in meats, poultry and mushrooms and their effect on flavour are summarized in a paper by H. Shimazono in "Food Technology" (March, 1964).

Considerable progress has recently been made in Japan in the industrial production of 5'-ribonucleotides for use as food seasonings. Taste panel tests have shown that disodium inosinate and disodium guanylate, added to foods, are very strong flavour enhancers. The use of *Ribotide Takeda*, a mixture of equal amounts of these compounds, as a flavour enhancer in various products, including canned vegetables, is discussed. The compounds may also be used in conjunction with monosodium glutamate. Methods of determining 5'-nucleotides in foods are briefly considered.

IMPROVED DRY FRUIT

Fruit dried by the new technique, called the *dry-blanch'dry* (D.B.D.) method is said not only to have bright colours and fine flavours, but is actually more fresh-like when cooked than sun-dried fruit. The method consists of drying in heated air at 180°F for a few hours, then exposed to steam for a few minutes and finally dry at 155°F for 6 to 24 hours.

"Agr. Research", 11, No. 10, 11 (1963).

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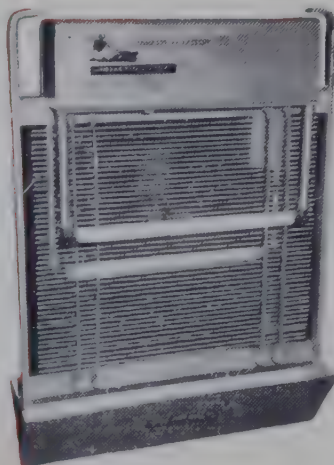
hygiene conscious??

Q. What is it?



Ans. This is a picture of a fly being electrocuted.

Q. What did it?



Model A6360
INSECT-O-CUTOR
UNIT

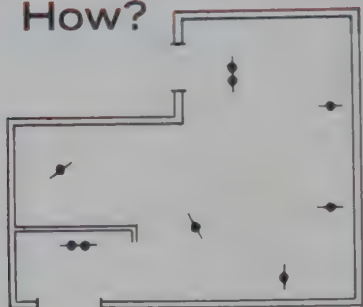
Electrified Grid, safe to humans, death to insects.

Black Light attracts insects to electrified grid.

Insect Catch Tray collects all insects killed.

Ans. SIMON INSECT-O-CUTOR. This is a picture of an Insect-o-Cutor unit which attracts, kills and collects all flying insects.

Q. How?



Ans. Attraction to 'black light' and contact with electrified grid. Various model Insect-o-Cutor units are available and protection from flying insects is given by their use as a designed system. We provide a layout of your building as above, showing positions and types of Insect-o-Cutor units recommended to overcome your problem.

Q. Why?

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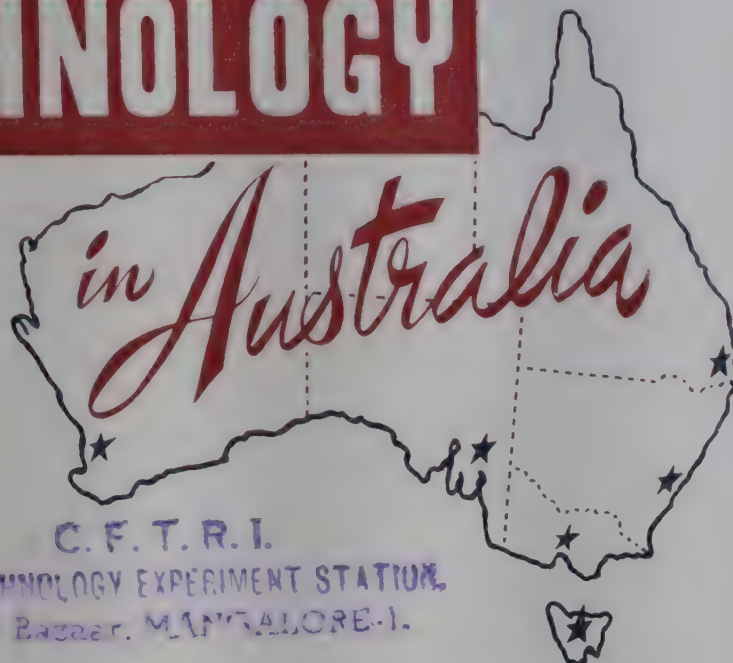
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APRIL, 1965



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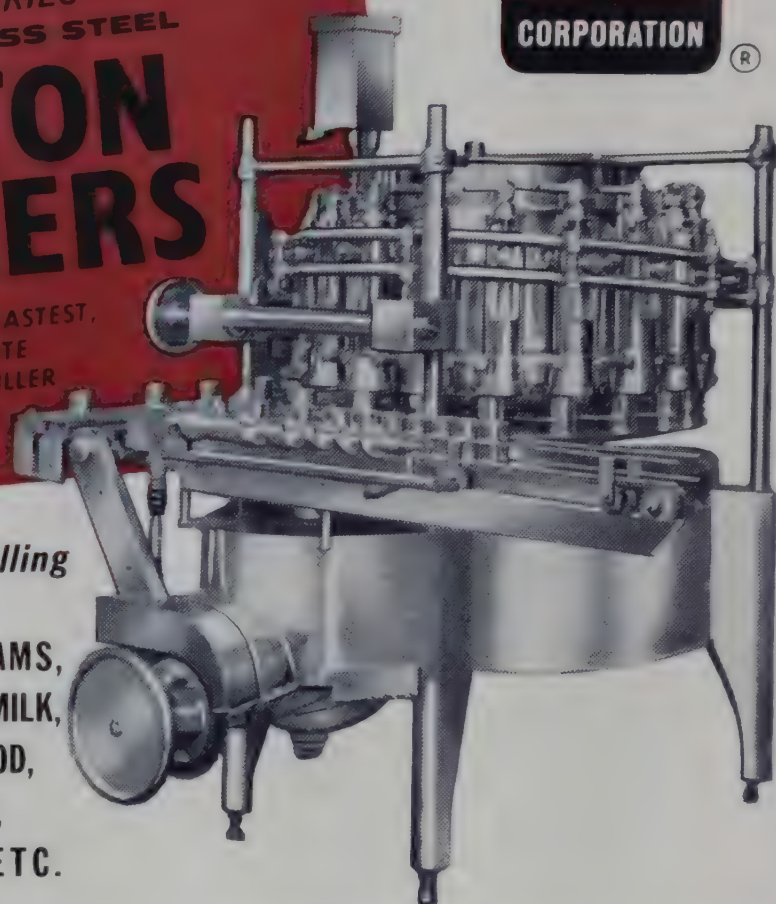
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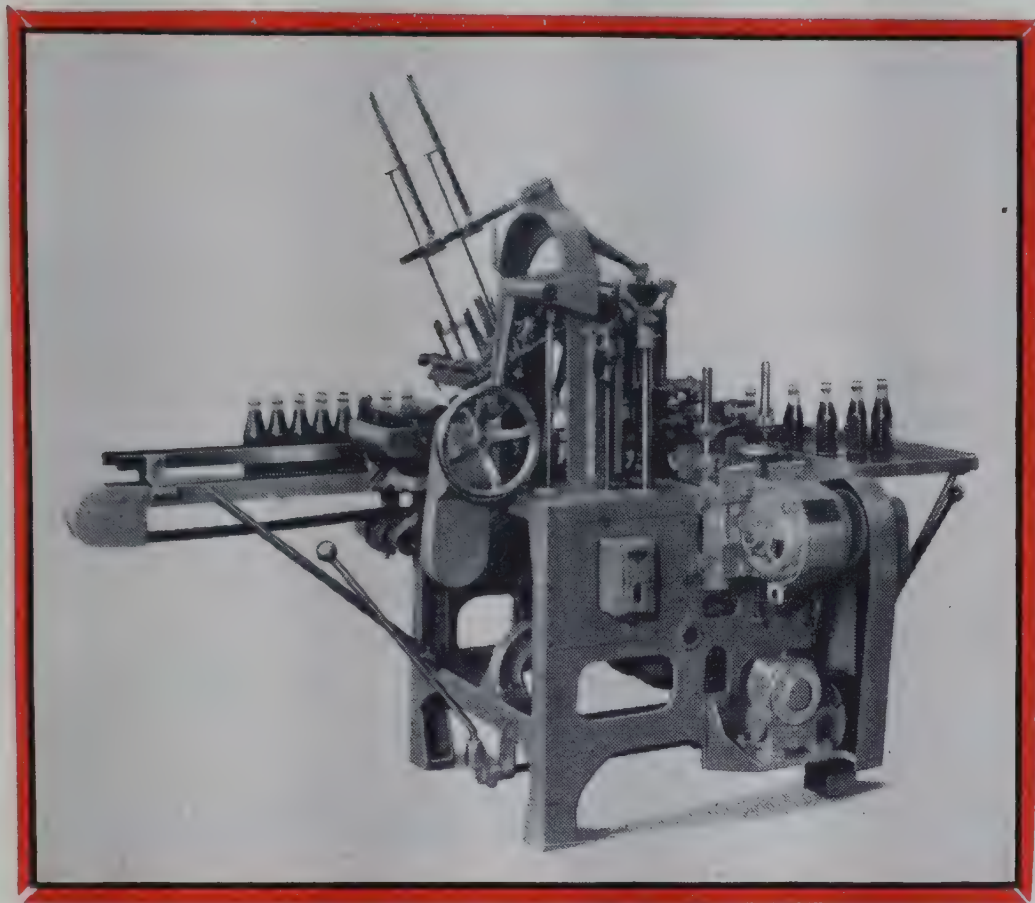
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Editor:

F. H. REUTER, Ph.D., F.R.I.C., F.R.A.C.I.
Associate Professor of Food Technology.
The University of New South Wales.

Business Manager:

S. M. ADAMS.

Office:

12 O'Connell Street, Sydney, N.S.W.
Telephone: 25 5401.

All correspondence to be forwarded to this
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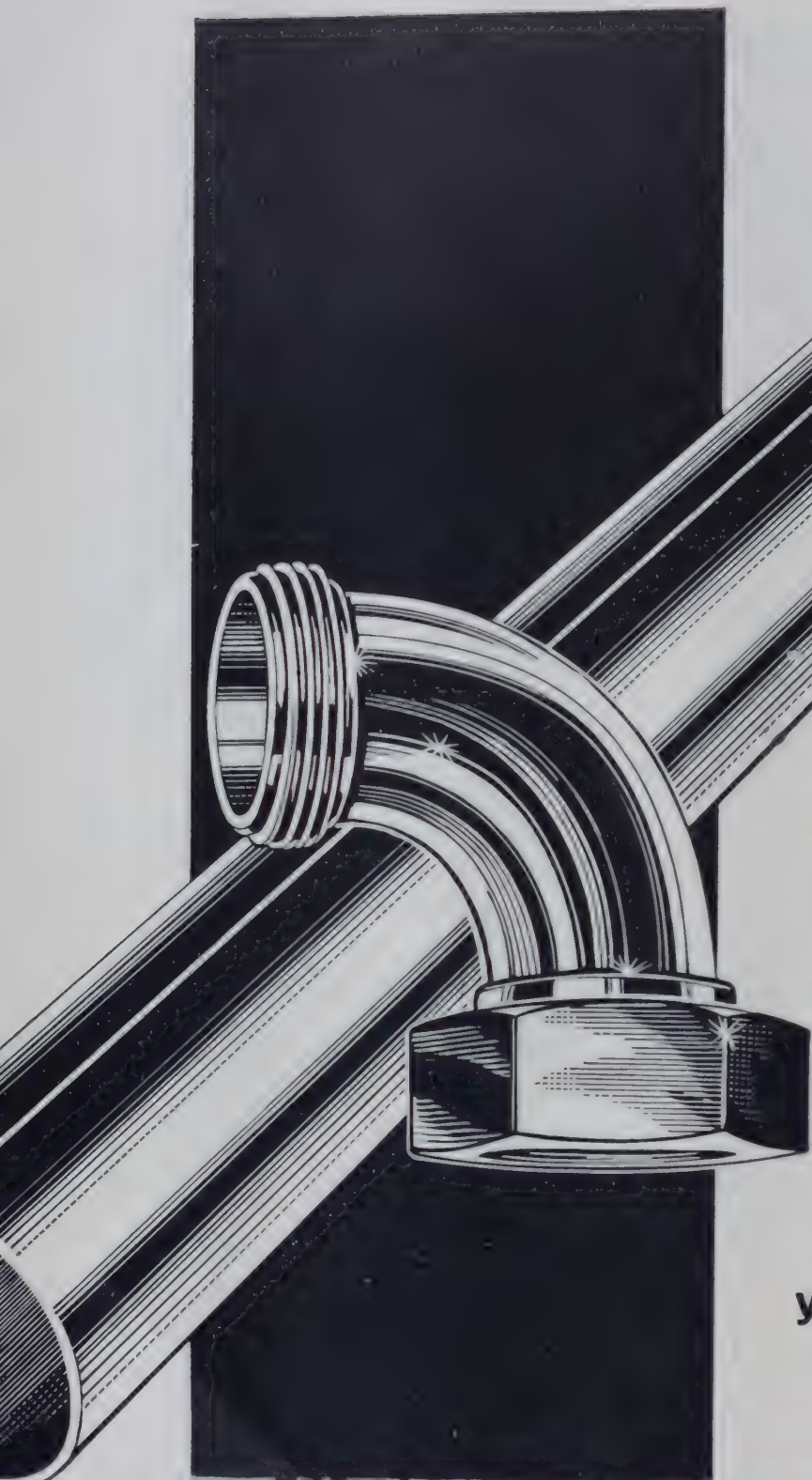
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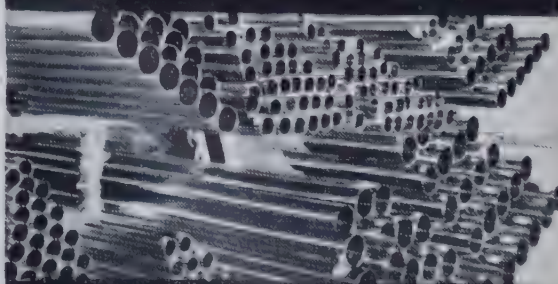
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The Horns of a Frozen Food Dilemma

Two documents are now being submitted for comment to Australian food processors and certain ancillary industries. Both relate to quick frozen foods and it is noted that they are inconsistent with each other.

One is the Australian Standards Association's Draft Standard for Frozen Food Retail Cabinets, the other the Draft Regulation for the Sale, Storage, Display and Transportation of Frozen Foods which, under *Uniform Procedure*, is to be circulated to industry for comment and amendment.

The S.A.A. Document (No. 910) prescribes minimum requirements of construction and performance of refrigerated cabinets for the storage of frozen foods, including ice cream, on which a note was published in the February issue of this journal. This gave particulars so as to encourage those with a specific interest in the subject to procure a copy of the document and give the benefit of their comments to the Standards Association of Australia not later than 31st May, 1965.

The need for a standard for these cabinets had arisen from the realization that the comparatively high temperatures at which frozen foods are being held in retail stores is a major cause of the unsatisfactory quality of so many frozen articles in Australian retail stores. Another one is the lack of efficient temperature control during transit from the wholesaler to retailer. To be more precise, the present trouble is that frozen foods are too warm when delivered to retailers and then sold from cabinets, most of which cannot pull down product temperature. Of course, these cabinets were never designed to do this job, nor are they located in the stores or managed in

a manner that would allow them to do it if they had the capacity.

Cabinets therefore were singled out as a conspicuous weak link in the *cold chain* through which frozen foods pass on the way from manufacturer to the consuming public. The remedy was seen in the provision of an Australian Standard to serve as a guide for the users and makers of these cabinets.

In the first instance this standard had been intended to cover display cabinets only, but as work progressed the drafting committee came to realize that, under present Australian conditions, the cabinets deserving of this name provide the only place in retail outlets for the storage of frozen foods. The term *retail cabinet* was therefore selected to acknowledge the dual function of display and incidental storage.

A frozen food retail cabinet is then defined as an assembly consisting of a thermally insulated cabinet for the merchandising of frozen foodstuffs and a refrigerating unit arranged to extract heat from the cabinet. The cabinet may be closed or an open type or a combination of both. In either kind of cabinet, product temperature may be maintained by the forced circulation of air or by air circulation induced by convection from evaporator plates.

The draft standard is drawn up under the following headings: scope, design and construction, volume and area ratings, tests, test packages, instruments and marking. Recommendations on the operation of frozen food retail cabinets have been included in an appendix.

The buyer of a frozen food retail cabinet which meets these specifications will then be assured of its satisfactory performance in main-

— Continued on page 219



NEW DAIRY FOODS

By R. A. BUCHANAN

C.S.I.R.O., Division of Dairy Research, Melbourne.

INTRODUCTION

In our work on new food forms, we aim to increase the utility and total consumption of foods derived from milk and dairy products.

If we list the major dairy products in Australia, as shown in Table 1, we see that each adds its quota of milk utilized to the total. Remove a product and less milk is used. If we add more products to the list, more milk will be used.

It is unlikely, though not impossible, that any new product even when fully developed will account for as much milk as any of the major classes listed in the table. Success is more likely with a product *tailor-made* to meet some special but limited requirement in industry or by the consumer. It is worth remembering that a mere change in utility, without change in composition, as in instant milk powder, can open up or add to existing markets.

MILK POWDER FOR BREAD

The special skim powder for bakers, with glycerol monostearate and potassium bromate added, is well known to the dairy industry

and to bakers. In preparing this product the skim milk is heated to 185°F for 30 minutes before concentrating then the bromate and G.M.S. emulsion added after concentrating. This powder can be used in bread containing no other source of fat — most bread contains about 2 per cent fat. But many bakers prefer to buy skim milk powder without additives then add the other ingredients separately. In these cases they need high-heat powder prepared from skim milk which has again been heated to 185°F for 30 minutes before concentrating.

This high heat treatment is needed in both cases because unless 50-90 per cent of the whey proteins are denatured, giving a whey protein nitrogen value of less than approximately 1.5, the loaf volume of the bread is seriously depressed — in fact medium heat treatments are worse than no treatment at all in depressing loaf volumes. About 3000 tons of this powder is being made in Australia each year. But this example illustrates our first problem. In many cases bakers are using powder which has had insufficient heat treatment before drying. This leads to reduced loaf volumes so bakers are tending to reduce or eliminate the use of skim milk solids in their bread. Moves recently made have been designed to make it much easier for bakers to identify milk powders suitable for use in bread.

Summary of an Address to a Joint Meeting of the I.F.T., Northern Australia Section and the Australian Society of Dairy Technology, N.S.W. Division, 13 10 64.

TABLE 1
MILK USE IN 1962-63

	Milk million gal.
Butter	940
Skim milk powder	
Buttermilk powder	
Casein	326
Pasteurized milk, ice cream	
Cheese	130
Condensed milks	15.4
Full cream dried milk	10.2
Infant foods	10.5
Malted milk	

Two modified skim milk powders which will replace eggs in confectionery were developed some time ago. Fluffex and Albumix which will replace egg albumin and meringues or pie glazing are currently being produced in Victoria.

A whole-egg substitute powder has been developed although it is not in commercial production at present. But there has been a renewed interest in it recently by a large cake manufacturer in England, by local firms interested in prepared cake and sponge mixes, and for use in a cake topping recently developed by the Queensland Department of Agriculture.

More recently, to improve the utility of milk powders in hot drink dispensing machines, addition of a free flowing agent proved satisfactory as a means of preventing caking and aiding the flow of the powder. The use of sodium aluminium silicate and calcium phosphate as a milk powder additive for this purpose has now been approved by health authorities throughout Australia.

A means of improving the nutritional value of skim milk powder by adding vitamin A in a stable form was devised. Retail packs of vitamin A fortified non-fat dry milk are now readily available throughout Australia and U.N.I.C.E.F. have distributed several million pounds of the fortified product in under-developed countries.

Butter concentrate is another product which was developed for a special purpose.

During World War II the armed services, particularly in the Pacific area, required a spread for bread which would withstand the tropical field conditions more effectively than did tinned butter. The product finally devised, and used extensively in the final stages of the war, consisted of butterfat with usually a small addition of hydrogenated stearin to raise the melting point slightly, and with dispersed skim milk powder and finely ground salt.

The product was cooled rapidly to give a smooth texture to the fat. Water can be mixed in to give a product more like butter — the solid ingredients are otherwise slightly gritty to the palate.

The product is still manufactured commercially for use in the Pacific Islands and in Inland Australia and is currently the subject of renewed interest by the U.S. and German armed services.

CHEESE POWDER

Our cheese group have successfully developed a new method of drying Cheddar cheese. The cheese is grated then mixed with about 30 per cent by weight of skim milk powder, buttermilk powder or whey powder. The mixture can then be dried in a stream of air at temperatures up to 160°C without troublesome melting and exudation of fat.

Most of the volatile cheese flavour and off-flavours are lost during drying. Several types of cheese flavour may be restored to the product by adding some fatty acids, methyl ketones or commercial cheese flavour preparations.

One commercial cheese-drying plant is operating in Melbourne and another in Japan.

RECOMBINED PRODUCTS

The original work on recombined evaporated and sweetened condensed milk was carried out by the new foods group. This is now developing into a huge industry, and a special new group has been formed to handle its problems.

The Australian Dairy Produce Board has taken over a plant in Manila, for the production of recombined evaporated milk. Plants are being established in Bangkok and Singapore for the production of recombined sweetened condensed milk.

Evaporated milk contains approximately 8 per cent fat and 18 per cent milk solids-not-fat and is heat sterilized at approximately 240°F for 20 minutes.

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Sweetened condensed milk contains the same fat and milk solids-not-fat percentages but 44 per cent sugar as a preservation so that the product need not be sterilized.

The products are well known but manufacture by recombining butter-oil and skim milk powder is new.

There have been several major engineering problems in designing the plant to cope with large scale production. There have also been some unexpected problems such as as a local bias against the rather high colour of our recombined sweetened condensed milk, caused by the high carotene level in some of our butterfat. But our major concern at C.S.I.R.O. has been to determine the type of ingredients most suitable for these products.

While the same well-flavoured butterfat is suitable for all recombining, skim milk powders of a number of different characteristics are needed for the various products.

For recombined pasteurized milk, or for cottage cheese (in which good coagulation is essential) a low-heat powder is needed. This means, in terms of the Harland-Ashworth whey protein nitrogen index, a figure above 6.0, and calls for low heat-treatment throughout the manufacture of the powder.

While as far as initial flavour goes the same powder would appear ideal for all recombined products, certain technical disadvantages preclude its use for evaporated or sweetened condensed milk.

SWEETENED CONDENSED MILK

For sweetened condensed milk such powder will cause flavour defects on storage, since all the lipase is apparently not destroyed during manufacture. It will also fail to give the correct viscosity in sweetened condensed milk. The best results have been obtained in experimental and practical experience so far by the use of medium-heat powders, or mixtures of high- and low-heat powders so blended as to give

a suitable initial viscosity. In our experimental work we have found a very close relationship between rate of age thickening and initial viscosity of the product, whether the change in initial viscosity arises from difference in the powder, pasteurization temperature, or in the homogenization pressure. It is clear that with lower initial viscosity the product will remain at a usable thickness for considerably longer. The only reason why we cannot use this advantage is that the market is accustomed to a sweetened condensed milk made in the usual way. If we can gradually accustom the market to a lower initial viscosity (assuming fat-separation can be avoided) we will be able to supply it with a product of longer shelf life. In the other common form of deterioration also, browning of the colour, the recombined product, no doubt because it undergoes less total heating seems to have some potential advantage. (Several important properties of sweetened condensed milk can be more readily manipulated in the recombining process than in the normal method of manufacture.)

The effect of the type of milk powder on the properties of recombined sweetened condensed milk will be filled out in detail by work we are now commencing. This will cover, in particular, the variations resulting from regional and seasonal differences in production.

EVAPORATED MILK

With evaporated milk a different series of problems emerges. The central problem is the need to avoid heat-coagulation during sterilization. This is achieved in general by moving towards a high-medium or high-heat powder.

Early experience in Asia in the manufacture of recombined evaporated milk showed that skim milk powders of similar analysis frequently varied in their ability to withstand coagulation during sterilization of the product, and that

some were unresponsive to the use of disodium phosphate as a stabilizer. A laboratory test for heat stability with and without stabilizer was devised, and tentative criteria for heat-stable powders were determined in collaboration with the Manila plant of Milk Industries, Inc. The screening with this test of all powders sent to Manila overcame the immediate problem.

The test also proved of value in studies of factors affecting heat stability. It was used in conjunction with the supply of powders of known treatment from the industry to define the factory processing conditions needed to give heat-stable powders.

These conditions were found to vary seasonally and between districts. The response of the powders to the use of disodium phosphate as a stabilizer also varied. A number of factors which may have been involved in this variability were examined. One of the most important is the pH of the test solution in relation to the pH at which the particular powder shows maximum heat stability. The pH of maximum stability occurs within a very narrow range — of the order of ± 0.02 of a pH unit. It may be below or above the natural pH of the powder and hence achievement of maximum stability may result from increasing the pH with, for instance, disodium phosphate or decreasing it with monosodium phosphate as a stabilizer. The pH of maximum stability appears to change seasonally in a particular district and to be decreased by increasing heat treatment during processing.

Very small amounts of developed acidity could affect the heat stability of the powder. A number of skim milk powders were analyzed for lactic acid, using an ion-exchange technique. These showed a considerable range, the maximum being about ten times the minimum. The minimum value, even in fresh milk, was not zero and an investigation is being made as to whether this is due to the natural occur-

rence of some lactic acid in milk or to other causes.

The installation of pilot-scale facilities for the manufacture of recombined dairy products was completed in January, 1964. The plant is being used to examine the significance of the laboratory findings on heat stability. Another problem in evaporated milk manufacture, the control of viscosity to prevent undue cream separation, is also being studied in relation to both raw materials and recombining processes.

I have been into some detail about the different types of milk powders used in these recombined products, largely to illustrate how important it can be with any product containing milk solids that you get the type of powder most suitable for your special need. Secondly, if you are using skim milk powder for a special reason or as part of a new product, seek advice from a competent authority on the type of powder which is most likely to suit your purpose.

RECOMBINED CREAM

For a special market in Hong Kong we recently developed a 35 per cent fat recombined cream which could be whipped in the normal way to about 150 per cent overrun. Normal recombined cream cannot be whipped because it has been homogenized.

Now we have extended this work over the last few weeks and have been able to produce a low fat (19 per cent butterfat) cream which will give a 250 per cent overrun and remain firm and smooth after whipping. We feel that this product, costing little more to produce than cheap mock creams made from vegetable oils, could find a market in Australia as well as in Hong Kong. It is being tested in Melbourne.

SPECIAL DIET FOODS

Over the past 18 months we have successfully developed three new products suited to special dietary needs.

The first was a prepared cake mix for coeliacs. Coeliac disease is caused by an enzyme defect in the intestine and patients cannot tolerate the wheat protein, gluten, in any form. In effect, flour must be eliminated from their diet. This cake mix, based on butter powder and starch, will be on the market as soon as commercial quantities of butter powder are available.

A diabetic cake mix, based on butter powder and a low level of carbohydrate, has been developed but will not be released until butter powder is readily available.

Thirdly, a home-made ice cream with a low protein and salt content has been developed. The formulae is based on cream, sugar and water thickened with cornflour. It is being used extensively at the Children's Hospital in low salt diets because it contains only 4.5 instead of the usual 31 mg/oz. of salt. The low protein level is essential for children suffering from phenylketonuria — an inherited disease caused by a metabolic abnormality in the liver. The amino acid phenylalanine, which comprises about 3.5 per cent of milk protein, accumulates in the body and has a toxic effect associated with mental retardation.

Our ice cream contains less than one-fifth of the normal percentage of phenylalanine. This allows most of these children to have a 2½ oz. serving of ice cream with a meal, and is, I believe much appreciated by parents of phenylketonurics living at home. They find that meal planning is much easier when the whole family can enjoy sharing in the low phenylalanine diet.

BUTTER POWDER

This is a spray dried powder containing 80 per cent butterfat and less than 1 per cent of moisture, the rest being emulsifier, non-fat milk solids, sucrose, citrate and free flowing agent. It is not intended to be reconstituted into butter but is designed for use in baked goods

and is particularly suitable for use in prepared cake mixes, or any other product where it is necessary to mix a fat with dry ingredients such as sugar and flour.

We feel that butter powder is an ideal product to deal with the surpluses which everyone acknowledges are bound to occur from time to time. Since it cannot be reconstituted into butter and used as a spread, it will not compete with the main butter market. Yet it is admirably suited for use in baking, especially cake making, both commercially and in the home, where it can be used mainly as a replacement for margarine.

The manufacturing process has been patented in six countries and licencing of manufacturers is being handled by the Dairy Board:

1. In New Zealand the control of licencing has been handed over to the N.Z. Dairy Board.

2. In Japan the Rokko Butter Co. is ready to buy a spray drier and start manufacturing butter powder as soon as we can tell them exactly what equipment to buy and exactly how to operate it. In other words they are waiting to gain the benefits of our practical experience before they begin commercial production.

3. In the U.S.A. several firms have indicated an interest in a licence but as far as I know no firm arrangement has yet been entered into by the Dairy Board.

4. In the U.K. the issue of manufacturing licences will depend on the British attitude towards Butter Powder in whether or not they regard butter powder as part of Australia's butter quota. If it becomes part of the butter quota then a licence to manufacture butter powder in the U.K. will probably be issued.

5. In Canada a co-operative dairy company handling an average of 150,000 gallons of milk per day has indicated an interest in the project.

6. In Australia, a Victorian firm

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was issued with a licence about 12 months ago.

However the difficulties associated with drying and cooling the powder in their existing equipment proved too great.

Since the industry apparently needs the production details more precisely spelt out, we have recently installed a modified Rogers Spray Drier which we feel sure will produce a satisfactory powder economically. Our plant will produce 100-150 lbs of butter powder per hour, and we are designing a powder cooler to operate in conjunction with it.

When this is working properly it should be a relatively simple matter to scale up the entire plant for commercial production.

HIGH PROTEIN MILK POWDER

One of our next major projects will, we hope, be the development of a high protein milk powder. The process we have in mind is based on the precipitation of all the proteins in skim milk with heat and calcium chloride then centrifuging off about 70-80 per cent of the whey and drying the residue. Such a product, we envisage, would contain 60-70 per cent protein instead of the normal 36-38 per cent. It should be a cheaper source of milk protein than skim milk powder, casein or sodium caseinate. It could be used as a protein supplement in a wide range of foods and appears well suited as a basis on which to develop new foods especially designed for the under-developed countries in general and South East Asia in particular. Dr. Kon, Deputy Director of the N.I.R.D. in England, has expressed a keen interest in this work and a desire to collaborate with us. May I comment on this by saying that we feel this approach offers the greatest challenge yet in the *New Foods* field — new products for the developing countries.

F.T.A. of Victoria

An interesting Food Tasting took place at a Buffet Dinner held by the Food Technology Association of Victoria at the William Angliss Food Trade School on Thursday, 18th March.

After the Buffet Dinner guests were invited to taste a range of foods including bread, frozen fish, frozen peas, and ice cream. By filling in a simple form guests were able to compare their judgment with an expert test panel which had been drawn together for the tasting bee.

VICTORIAN PACK COURSE EXTENDED

The two-year packaging course at the Royal Melbourne Institute of Technology has been extended by the addition of three subjects.

These are: "*Economic Background for Management*" and "*Principles of Management*" for first year students, and "*The Psychological Aspect of Management*" for second year students.

This will entail an additional session per week for students.

FOOD STUDY GRANT

Professor S. E. Wright of the Department of Pharmacy, University of Sydney, has been awarded a grant of £10,800 by the U.S. Public Health Service.

The grant, extending over two years, will allow Professor Wright to continue his research into the metabolism of food additives and insecticides.

The money will be used to determine what happens to chemicals when they are added to foods. These chemicals include colouring, preservatives, insecticides and emulsifiers.

Food Technology in Europe

(Continued from Vol. 17, No. 3, page 130)

SEMI-PRESERVES

Three papers were presented in the section devoted to Semi-Preserves, the chairman being Mr. T. McLachlan:

MICROBIOLOGICAL ASPECTS OF HIGH PROTEIN FOODS, by Dr. D. A. Mossel, Central Institute for Food and Nutrition Research, Utrecht.

Semi-preservation stabilizes foods without necessarily sterilizing them. Semi-preservation also differs from pasteurization, because the heat treatment is not lethal for all groups of micro-organisms. Semi-preserved foods form a heterogeneous group of foods and are best classified by the stabilization treatments to which they have been subjected. These include heat treatment (pies, wrapped bread), heat treatment and curing (hams and other cured meats) reduction of water activity (marzipan), reduction of water activity and pH (jams, semi-preserved fish, sauerkraut, etc.), reduction of pH (yoghurt), reduction of pH and addition of preservatives (mayonnaise, egg, meat or fish salads), reduction of pH and *attenuation*, i.e. deprivation of nutrients (certain beverages).

The stability of semi-preserved foods varies greatly from a few days to almost unlimited periods; standards for the examination of these products must therefore be specific for each and must be devised bearing in mind the epidemiological record of the commodity, the potential health risks involved, the stability expected by the trade and the consumer, and the possibility of improving the existing manufacturing and storage practice. The following steps are involved in the

examination of semi-preserved foods: (i) sampling — the extent and frequency of sampling depends on the origin of the food, (ii) pre-incubation for about 5 days at 22°C, (iii) general inspection, including the condition of the container, presence of excess pressure, obvious signs of microbiological spoilage, such as slime, swelling, liquefaction, abnormal odours, etc. (examination of an unspoiled sample may then indicate means of preventing gross spoilage), (iv) microbiological examination of a representative sample for *Salmonella*, *Shigella*, *Staphylococcus aureus*, sulphite reducing *Clostridia*, *Enterobacteriaceae* in pasteurized products or *E. coli* type Coli in raw foods, total aerobic and anaerobic counts, moulds, etc.

In the manufacture of semi-preserved foods, microbiological control methods are essential and the heat treatment and other factors, must be worked out individually for each product. The importance of examining the plant and packaging materials for microbiological contamination cannot be overstressed. The alginate swab technique, although not ideal, is at present the most generally applicable method. The results obtained with it on fibrous surfaces are less satisfactory than on non-porous surfaces. If the plant is contaminated, it must be disinfected and a method of assessing efficiency of disinfectants against test organisms must be made.

SOME ASPECTS OF PICKLE PASTEURIZATION, by Mr. D. A. Shapton, H. J. Heinz Ltd., London:

Semi-preserves in this discussion are defined as foods preserved by acids, salt, sugar, spices and essential oils, which are subjected to

mild heat treatment (pasteurization) to potentiate the preservative action of the ingredients. Pickles are representative of this group.

Public taste has recently swung towards less acid pickles. As the concentration of acetic acid necessary to prevent microbial spoilage is 3.6 per cent, which results in a sharp pickle, pasteurization is necessary if the acidity is reduced to about 1 per cent. The pasteurization technique played an important role in the growth of the American pickle industry and is likely to enable British manufacturers to meet the demand for milder pickles. Practical aspects of pasteurizing procedures have been described in the literature during the past 20 years. The concentrations of acid, salt and spice oils influence the thermal death times of micro-organisms. Studies of peroxidase showed that more severe heat treatment is required for the destruction of this enzyme than for microbiological control. Fortunately, complete destruction of peroxidase is unnecessary for the prevention of off-flavours from this cause. A certain number of bacteria, largely peptonizing types, are unaffected by the process. By filling pickles at a sufficiently high temperature, the heat of the pickle may be utilized to pasteurize the container.

A knowledge of the initial microbial load, a decision on the permissible number of micro-organisms in the finished product, the determination of the thermal death time of the most resistant organisms, the evaluation of the amount of lethal heat and the assessment of these data are needed for the design of adequate pasteurization processes.

EVALUATION OF DRIED FOODSTUFFS, by Dr. H. Mohler, Knorr Food Products, Zurich.

Drying protects foodstuffs from unfavourable changes, such as microbiological and enzymatic attack and chemical and physical deterioration. Ten criteria for the assessment of dried foodstuffs are pro-

posed: organoleptic properties (including colour), nutritive value and digestibility, hygienic condition (absence of micro-organisms, insecticide residues), enzymatic activity, behaviour on reconstitution or rehydration, plasmolytic test, brittleness, oxidative deterioration, browning reaction and sorption isotherms.

Dehydration of foodstuffs is carried out by vaporizing the water present in the raw material. Knowledge of the vapour pressure of foodstuffs as a function of water content and temperature is therefore essential for the design of dehydration plant. Sorption isotherms can be plotted to follow the adsorption of water vapour by a moist product at a specified temperature. Foodstuffs consisting mainly of polymers show sigmoid-shaped curves, the first part of which indicates the formation of a monomolecular layer of water, the second corresponds to multimolecular coverage and the third to capillary condensation. For most foodstuffs, a long shelf-life is associated with a monomolecular layer of water. The most useful procedure for recording sorption isotherms is based on exposing the product to a well-defined humidity and measuring the moisture content when equilibrium has been established.

Sorption kinetics have not been so fully investigated, but measurements can now be carried out by a self-registrating electric balance (Cahn balance). Sorption kinetics can be used to distinguish between air-dried and freeze-dried products.

Conventional drying processes under atmospheric conditions yield products with poor reconstitution or rehydration qualities, owing to cell shrinkage, loss of swelling ability and toughening of surfaces. These drawbacks do not arise until a critical quantity of water has been lost. Pre-drying goods to this point prior to freeze-drying would result in an acceptable product at lower cost. The plasmolytic test allows recognition of the critical point. It is based on the escape of



A discussion on product development absorbs the attention of Nestlé Food Technologist, Peter Schlesinger and John Kelly, Davis Gelatine (Australia) Pty. Ltd.

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potassium from the cell, as soon as the semi-permeable cell membrane has been damaged. The critical water loss is paralleled by a steep rise in the potassium output of the partially dehydrated food when placed into water. For example, the critical water loss for carrots is about 30 per cent, the potassium output rising from 25 to 63 mg/100 g fresh carrots between 30 per cent and 40 per cent water loss.

DISCUSSION

Much of the discussion centred on details of microbiological technique, e.g. conditions for the isolation of *Salmonellae*. The pasteurization of pickled onions was also discussed. Pickled onions must be mild in flavour and crisp in texture; unfortunately, pasteurization tends to destroy crispness and to produce a *cooked* flavour. The process must therefore be carefully controlled and two factors which have to be borne in mind especially are the method of peeling and spicing. Abrasive peeling results in a more intense *cooked* taste, while the pasteurization process extracts more flavour from the red and black peppers used as garnish and so makes the pickled onions too spicy.

VEGETABLES

This section devoted to Vegetables was presided over by Mr. W. B. Adam and three papers were given:—

THE PRODUCTION OF TOMATO POWDER, by Dr. F. Albanese, Birs Technica, S.A., Firenze.

The economic importance, world-wide popularity and nutritional value of tomatoes necessitate that much of the tomato crop in the growing regions such as Italy, needs to be conserved. The conventional Italian tomato products are *pelati* (peeled, canned tomatoes), concentrates in paste form, ketchup and juice.

A relatively new addition to the range is the production of tomato powder, by the Birs process which preserves the nutritional and

organoleptic properties of the raw material. The ripe tomatoes are washed with steam and hot water, pressed, and freed from seeds and skins. This results in a juice with 5.5 per cent solids. The juice is concentrated under vacuum at 35°-40°C to 28 per cent solids, and finally is *no-heat* dried by the Birs process. The Birs process consists of spraying the concentrate down a giant plastic-lined tower against a current of low velocity pre-dried air. The diameter of the tower varies between 16 and 32 m. according to the evaporation capacity; the height is 70 m. The filtered air entering at the bottom of the tower has a relative humidity below 3 per cent and leaves the top saturated up to 90 per cent. The air drying temperature is below 30°C. The air stream rising in the tower abstracts water from the falling particles, but capillary, osmotic and Van der Waals forces almost completely prevent the escape of taste and flavour substances during the drying process. The steam requirement is 1.5 kg steam per kg evaporated water. For over two years a plant in Siena has been used mainly for the production of tomato powder with a final moisture content of about 3 per cent. Forty lb of fresh tomatoes yield about 2 lb of tomato powder with no loss in colour, flavour, vitamin content and with good reconstitution properties.

POTATO PRODUCTS, by Dr. G. Adler, Pfanni-Werk, Munich.

In 1961 the world potato crop was about 240 million tons, of which up to 90 per cent was grown in Europe including the U.S.S.R. However, potato consumption in West European countries, has been declining since the war. To counteract this trend, the food industry must present potatoes in a form which can be served without much trouble.

In the U.S.A. in 1960 about 25 per cent of the potato crop was processed into potato crisps, dehydrated potatoes and potato chips. Euro-

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pean countries lag far behind in this field, but during the last few years the potato processing industry has grown rapidly in Europe.

The production of potato crisps is a fully automatic process. The potatoes are washed, peeled, inspected, and sliced — generally in rotating units with a capacity of up to 4000 lb per hour. The slices range from 1/16 to 1/32 in. in thickness and should be as uniform and smoothly cut as possible to give a product of satisfactory colour and quality. Free starch is removed from the slices by high pressure jets of water, and the slices are then fried in oil at temperatures between 350° and 375°F. The larger plant can handle between 4000 and 8000 lb raw potatoes per hour.

The light colour of crisps and chips is an important feature, potatoes with a high reducing sugar content give a dark-coloured product, so it is essential to lower the content of reducing sugar by removing the potatoes from the cold store and storing them for up to a week at 70°F. The potatoes should also have a high total solids content to improve the yield and reduce fat absorption during frying.

Potatoes for frozen chip production are peeled, washed, cut, blanched (this results in greater uniformity of colour, less fat absorption during frying and better texture), fried, frozen and packed.

Dehydrated mashed potatoes can be produced by drying mashed potatoes on a drum drier, or by mixing mashed potatoes with previously dried potato powder to obtain a moisture content of 35 to 40 per cent, which is then further reduced to 12-13 per cent. The Birs process can also be used to produce dehydrated mashed potatoes.

Dehydrated diced potatoes are practically unknown in the retail trade, but the soup industry uses them and they are becoming popular in institutional catering. In West Germany they find application in the production of potato dumpling and pancake mix.

Prepeeled potatoes are useful in the catering trade, and they are now being introduced to the housewife. For the retail trade, the shelf-life of peeled potatoes must be at least a week. This is achieved by treating the potatoes with SO₂ and storing them in polyethylene bags at 32°-42°F.

OTHER VEGETABLES, by Mr. J. S. Gill, Mather & Platt, London.

The increasing degree of automation and mechanization is the most obvious trend in modern vegetable processing. This involves more precise specifications of the raw material, *i.e.* careful selection of the most suitable varieties, and tighter controls during processing. There is a tendency towards smaller packs and towards higher speeds on the processing lines.

Improvements in harvesting depend both on advances in plant breeding, *e.g.* developing a dwarf bean variety with a very sharp maturing curve, and on progress in the design of mechanized harvesting equipment. In pea picking, mobile viners are being introduced which can harvest about one ton per hour and attempts are being made to pick pea pods automatically. Dwarf beans are another crop which is harvested mechanically and machines have been designed which will pick four rows at once.

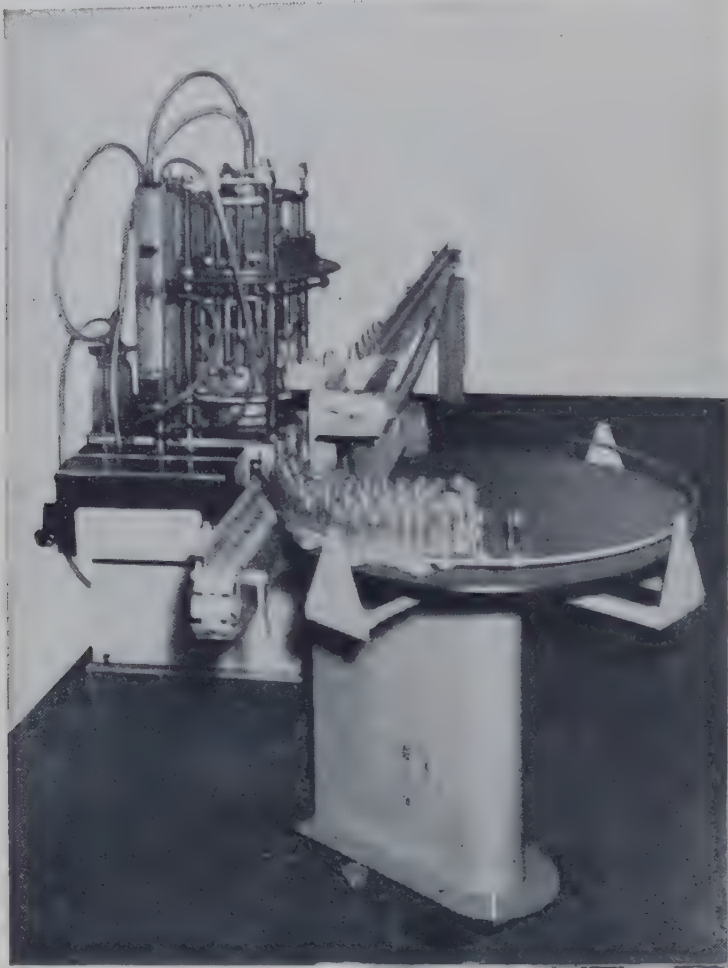
Transport from the farm to the factory presents little difficulty in the case of root crops, but is beset with problems in the case of perishable vegetables, such as peas and beans. Cooling by refrigerated water plays an important part in preventing deterioration of peas on the journey to the factory.

Washing and cleaning are vital steps in processing and much of the cleaning is now carried out on the farm or at the collection station. Automatic de-stoning of root vegetables has been introduced.

Grading for size is important in improving pack appearance and in creating more uniform process conditions. Grading machines which

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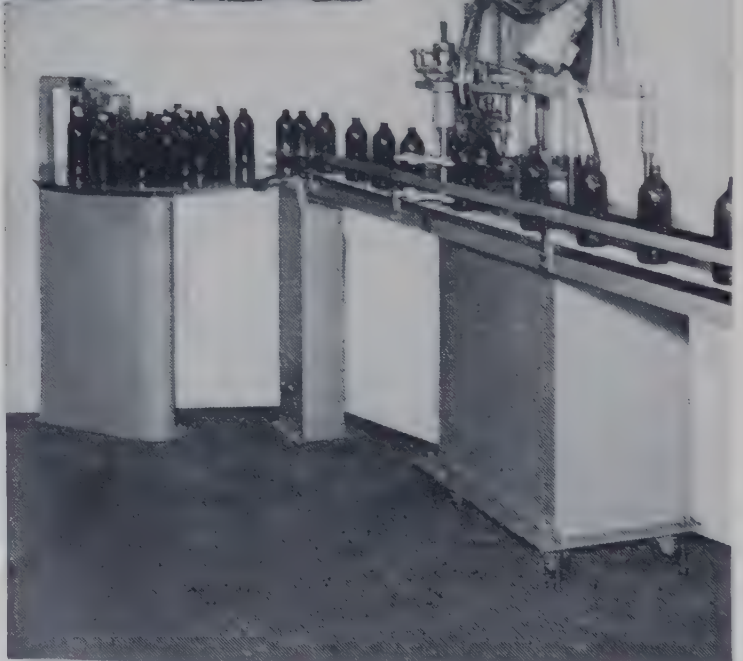
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can be used for different vegetables, e.g. carrots, and brussel sprouts, are being introduced. Pea graders tend to be designed with rectangular holes in the separating screens for improved speed and accuracy.

Blanching is still carried out mainly by water and steam, throughputs of up to nine tons per hour being obtained. The standard of hygiene of the blancher has to be high to prevent microbiological contamination, and this can be achieved by keeping all parts of the machine either above or below the danger zone of 120° to 160°F.

Carrots, beetroot, turnips, etc., are peeled by steam, lye and lye combined with abrasive methods. Onions are also lye peeled, although flame peeling is used on the Continent. A wide range of filling machines are available for quick, accurate and automatic filling.

Batch-type retorts are still used for sterilizing canned vegetable packs under special circumstances, but automatic continuous cookers are needed for higher speed filling lines. The cookers are mainly of the hydrostatic type which combines great capacity with a relatively small floor area.

DISCUSSION

In the discussion two points were raised. The first dealt with the retention of vitamin C in processed potato products. Dr. Adler pointed out that the loss of vitamin C is not greater in factory processing than in domestic cooking. However, the vitamin C content of potatoes depends largely on the length of time for which they have been stored, unless they are held under nitrogen, and the vitamin C content of the finished product therefore varies with the season. Mr. W. B. Adam stated that the tests made at Campden showed that freshly harvested potatoes contained 25-30 mg vitamin C/100 g, and that this fell to about 5 mg/100 g by February or April. The second point concerned the merits of producing mashed potato

powder by spray drying. The Birs towers have been used for this purpose.

SPOILAGE OF PRUNES

About 3,500 tons of prunes are produced in Australia each year, half of them in the Young district in southern New South Wales. They are marketed in two forms:—

High moisture prunes containing 33-37 per cent moisture, and

Dried prunes, the moisture content of which is limited by Australian export regulations to 22 per cent.

High moisture prunes were formerly marketed in cans, from which they were weighed out for customers by the grocer. The development of self-service stores led to a serious decline in sales of this product, and the prune industry appealed to the C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W., for help in developing a new mode of presentation.

It was found that an attractive pack could be obtained by filling the prunes hot into pouches made of a clear polythene-cellophane laminate. However, in spite of the fact that the process was mechanized, and although the filling of the pouches took place in an enclosed space, instances of spoilage sometimes occurred. The Division of Food Preservation therefore set out to isolate the micro-organisms causing the spoilage, in order to study the chemical and physical conditions which influence their growth. The heat resistance of the isolated organisms was measured, and on the basis of the findings, a process was devised for commercially sterilizing high moisture prunes in sealed polythene-cellophane pouches.

Moulds will also grow on dried prunes containing 22 per cent of moisture. Some of the types involved have been identified and the Division is now investigating means of controlling their growth.

Properties of Oriented Polypropylene Films

By H. A. RIGBY,

Imperial Chemical Industries of Australia and New Zealand Ltd.*

In the course of the last fifteen years, polythene film has become established throughout the world as a major transparent packaging film. It was produced in the early days of its development in both flat and tubular forms, but it was the tubular form which was more easily converted into bags and became the type of film most commonly manufactured. Its properties are well known. In recent years, cast, *i.e.* flat, polythene film has grown in importance because it has been produced with greater clarity than tubular film and because suitable conversion techniques and equipment have been developed.

The production of polypropylene has led to the introduction of cast polypropylene film which can to some extent be regarded as a superior form of cast polythene film, having better stiffness, tensile strength, grease resistance, permeability characteristics, and, when thin, clarity. Cast polypropylene film is essentially unoriented, but a high degree of orientation can be introduced by drawing the film at a temperature below its melting point in one or more directions. If the film is drawn in only one direction, either machine or transverse, the product is described as uniaxially oriented. If it is drawn in two directions at right angles to each other, the product is described as biaxially oriented. Several orientation processes are being developed, and these may vary radically or they may vary only in detail. The film may be drawn sequentially, first in the transverse direction and then in the machine direc-

tion, or the sequence of drawing may be reversed, or the drawing may be carried out simultaneously in both directions.

It is not surprising that the different processes give products whose properties vary from one to another. Thus, while the range of properties encountered in cast polypropylene films from different sources is fairly limited, the description *biaxially oriented* can be applied to polypropylene films with widely varying mechanical properties. When the orientation process is controlled so as to produce a film whose tensile properties are the same in both machine and transverse directions, the product is a *balanced, biaxially oriented* film. *Propathene* Films O, S and C are such products.

In Table I, some of the mechanical properties of cast polythene and cast polypropylene films are compared with those of a balanced biaxially oriented polypropylene film.

The orientation process has resulted in a great increase in tensile strength, and this is accompanied by a very marked lowering in percentage elongation at break. While the energy required for tear initiation is high, that for propagation is very low.

In Table II the mechanical properties of *Propathene* Film O and two other commercially available,

*Supplementary to "Polypropylene — Use in Food Packaging and Processing", pt. I (this J., 1965, p. 126) and in place of pt. II.

TABLE I

Thickness	Area yield	Tensile strength	Elongation at break	Tear strength
	1000 in. ² /lb	kg/cm ² direction lb/in. ²	% machine direction	% transverse direction g/25 micron
Cast LD Polythene	25	210	175	150
Cast PP	25	460	385	80
Propathene Film O	12.5	1,750	1,750	ca. 5

TABLE II

Thickness	Area yield	Tensile strength	Elongation at break	Tear strength
	1000 in. ² /lb	kg/cm ² machine direction lb/in. ²	% machine direction	% transverse direction g/25 micron
Cast PP	25	460	385	80
Propathene Film O	12.5	1,750	1,750	ca. 5
Type X Oriented PP	12.5	420	2,100	ca. 10
Type Y Oriented PP	12.5	1,050	2,300	ca. 5

TABLE III

Thickness	Area yield	Tensile strength	Elongation at break	Tear strength
	1000 in. ² /lb	kg/cm ² machine direction lb/in. ²	% machine direction	% transverse direction g/25 micron
Propathene Film O	12.5	1,750	1,750	ca. 5
Propathene Film C	16	1,350	1,350	ca. 5
Cellulose MSAT 300	ca. 24	900-	550	8-12
Cellulose MXXT 300	ca. 24	900-	550	8-12

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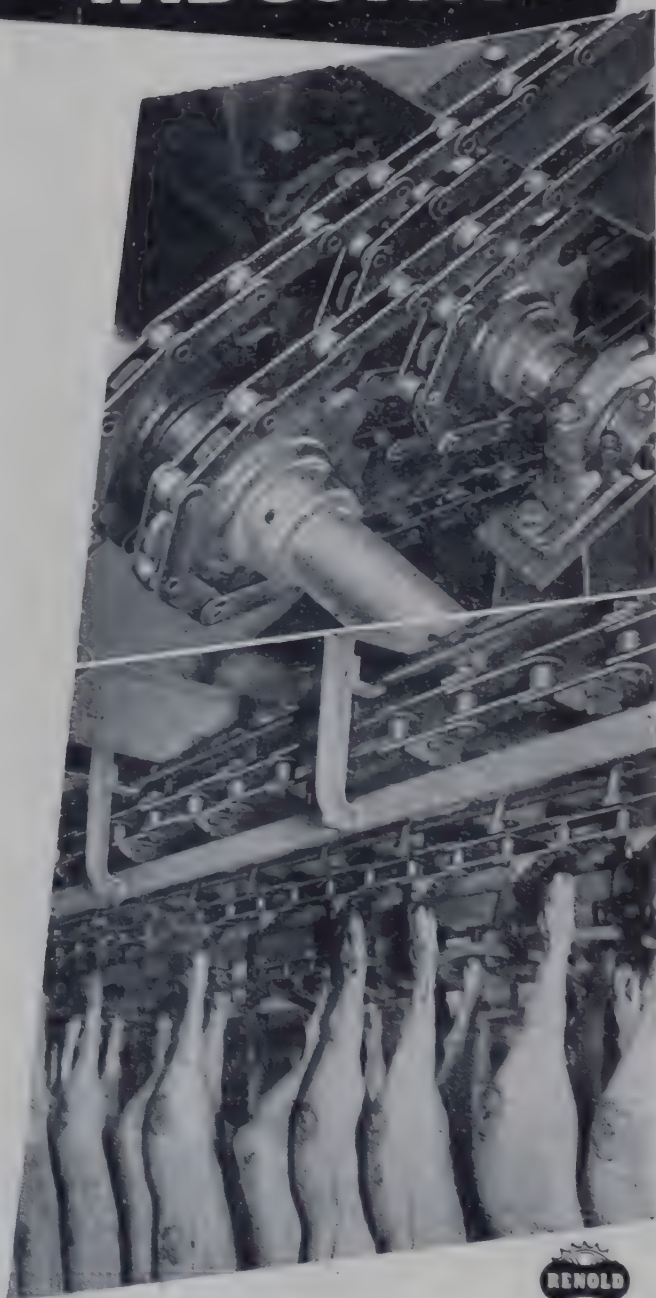
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biaxially oriented polypropylene films are compared with those of cast polypropylene film.

The variation between the tensile strengths of these samples is particularly marked in the machine direction, as is the variation in percentage elongation at break. Compared with unoriented polyolefin films, the energy required for tear propagation is low for all three oriented films.

A variety of heat-sealable coatings can be applied to oriented polypropylene films, and in Table III the mechanical properties of a polyvinylidene-chloride-coated oriented film (*Propathene* Film C) are compared with those of the base film before coating (*Propathene* Film O) and with those of the commonly used thinner gauges of nitrocellulose-coated (MSAT) and polyvinylidene-chloride-coated (MXXT) cellulose films.

It is evident that the tensile and tear-propagation properties of the oriented polypropylene films are much closer to those of cellulose films than they are to those of unoriented polyolefin films. It should be noted that the tensile strength of the base film is unaffected by coating, but since the coating does not contribute significantly to the overall strength, the average tensile

strength of the coated film is lower than that of the base film.

Some of the other properties of films which help determine their usefulness in the packaging industry can now be considered. Among the most important are appearance, permeability characteristics and low-temperature performance. These properties are compared in Table IV for cast polythene film, cast polypropylene film, and a balanced biaxially oriented polypropylene film. The slight improvement in gloss along with the marked reduction in haze confirms the greater clarity of the oriented film which is apparent on visual inspection. The permeability figures are quoted for the specific thickness of film noted. Cast polypropylene film is a better barrier against water-vapour and gases than is cast polythene film. The balanced biaxially oriented film is roughly twice as good a barrier as is cast film at the same thickness, so that the actual permeability of a 50 gauge (12.5 micron) balanced oriented film is roughly the same as that of a 100 gauge (25 micron) cast film. Cast polypropylene film has poor mechanical properties at low temperatures, whereas cast polythene film and oriented polypropylene film have excellent low-temperature properties.

TABLE IV

	Thickness		Permeability		Haze	Gloss	Low-temperature performance
	gauge	microns	water ¹	oxygen ²			
Cast LD Polythene	100	25	17	3,000-4,000	1.5-3.5	80-90	Excellent
Cast PP	100	25	12	ca. 1,800	0.5-1.5	85-90	Poor
Propathene Film O	50	12.5	10	1,800	0.2-0.8	85-95	Excellent

¹g/m² 24hr. at 90% R.H. 38°C.
²cc/m² 24 hr. at 1 atm pressure difference.

TABLE V

	Thickness		Permeability		Haze	Gloss	Low-temperature performance
	gauge	microns	water ¹	oxygen ²			
Cast PP	100	25	12	ca. 1,800	0.5-1.5	85-90	Poor
Propathene Film O	50	12.5	10	1,800	0.2-0.8	85-95	Excellent
Type X Oriented	50	12.5	13	2,700	0.2-0.8	85-95	Excellent
PP							
Type Y Oriented	50	12.5	10	1,800-2,000	0.2-0.8	85-95	Excellent
PP							

¹g/m² 24hr. at 90% R.H. 38°C.
²cc/m² 24 hr. at 1 atm pressure difference.



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The effect of different degrees of orientation on these properties is shown in Table V. The clarity and gloss of all the three different biaxially oriented films is excellent, and appearance obviously gives no indication of the degree of orientation of a particular sample of film. All the polyolefin films are extremely good barriers to moisture-vapour and the permeability characteristics of the oriented films only vary to a slight extent, the resistance to permeation increasing with degree of orientation. The low-temperature properties of all the oriented films are excellent.

These same properties are compared in Table VI for balanced oriented polypropylene films, uncoated (*Propathene* Film O) and polyvinylidene - chloride - coated (*Propathene* Film C), and typical nitrocellulose-coated and polyvinylidene-chloride-coated cellulose films. These are obviously all high-clarity films suitable for display packaging. The water-vapour permeability of 50 gauge (12.5 micron) uncoated

oriented polypropylene film is comparable to that of the thinner gauges of nitrocellulose-coated cellulose film, while 65 gauge (16 micron) polyvinylidene-chloride-coated oriented polypropylene film has moisture-vapour-permeability properties which are comparable to those of the polyvinylidene-chloride-coated cellulose films which are used where the best barrier properties are required.

Compared with the cellulose films, the uncoated oriented polypropylene film is a relatively poor gas barrier, but the application of a polyvinylidene chloride coating to this film gives a product which is as good a barrier to gases as is polyvinylidene-chloride-coated cellulose film.

Whereas the low-temperature properties of the oriented polypropylene films, both coated and uncoated, are excellent, the cellulose films in general use do not maintain good impact properties at low temperatures.

TABLE VI

	Thickness gauge	microns	Permeability water ¹ oxygen ²		Haze	Gloss	Low-temperature performance
Propathene Film O	50	12.5	10	1,800	0.2-0.8	85-95	Excellent
Propathene Film C	65	16	3-5	4-8	0.4-3.0	100-110	Excellent
Cellulose MSAT 300	ca. 100	24	5-12	6	2.0-4.5	95-100	Special grade necessary
(uncreased)							
Cellulose MXXT 300	ca. 100	24	1-8	4-8	1.5-3.5	95-100	Special grade necessary

¹g/m² 24hr. at 90% R.H. 38°C.
²cc/m² 24 hr. at 1 atm pressure difference.

— To be completed

A Note on the Detection of Aflatoxins in Peanut Butter

Methods suggested in the literature for the detection of toxic materials in peanut meals were found to be unsatisfactory when applied to peanut butter. A modified method for chemical detection of toxic materials is described in this note.

Paper chromatography proved to be unsuccessful, due to the presence of interfering oily materials. The oily residues, however, do not inter-

fere in thin-layer chromatography separations and the strong blue fluorescence, characteristics of the presence of toxic materials, shows up clearly just below a larger faint greenish fluorescence that is present in all peanut butters at R_f0.6. Details of the extraction, purification, and thin-layer chromatographic procedures are given.

C. Genest and D. M. Smith (Canada Food and Drug Directorate, Ottawa, Ont., Canada), "J. of the Association of Official Agricultural Chemists", 46, 817, 1963.

BOOKS, PAMPHLETS, etc.

"FOOD CHEMICALS CODEX"

Part I of this Codex, which is being prepared under the administration of the Food Protection Committee of the Food and Nutrition Board of the National Research Council, has just been published. This part contains specification-monographs for 25 food-grade chemicals and a major portion of the Codex section devoted to general tests and apparatus. Among the specifications are those for ascorbic acid, benzoic acid, citric acid, manitol, propyl gallate and sorbitol. The tests covered include those for arsenic, heavy metals, lead, and tocopherols and also those for determining melting range, pH, optical rotation, viscosity and solidification points. The publication may be obtained in loose-leaf form, from the Printing and Publishing Office, National Academy of Sciences, Washington, D.C., for a cost of 25 dollars.

"International Standards for Drinking Water"

2nd edition. 206 pages. W.H.O., Geneva, 1963.

"RECENT DEVELOPMENTS IN THE PRODUCTION AND MARKETING OF APPLE JUICE AND CIDER"

A bulletin by D. C. Dalrymple and I. C. Feustel of the Division of Marketing and Utilization Sciences, Federal Extension Service, U.S. Department of Agriculture (1964) discusses economics, canning, freezing, and dehydration connected with apple juice and cider. Also included is a section on developments occurring in countries outside of the U.S.A.

"600 Recipes for Canned and Frozen Foods"

By M. Patten. 96 pages. Paul Hamlyn, London, 1963.

"FOOD STANDARDS COMMITTEE REPORT ON COLOURING MATTERS"

Ministry of Agriculture, Fisheries and Food. 22 pages. H.M.S.O., London, 1964. 1/6d.

The report reviews the provisions of the existing (British) Colouring Matter in Food Regulations, 1957. It recommends that *Ponceau 3R*, *Ponceau SX*, *Naphthol Yellow S*, *Blue VRS*, *Yellow RFS* and *Yellow RY* should be withdrawn from the list of permitted colours, and that *Black 7984* should be added. It also recommends that titanium dioxide should be permitted only for the surface colouring of food, that *beta-apo-8'-carotenal* and *canthaxanthin* should be permitted for colouring food, and that the colouring of citrus fruit should be prohibited.

It further recommends that standards of purity of permitted colours should be laid down and that, because of the desirability of internationally accepted specifications of purity, these should where available be those of the World Health Organization and the Food and Agricultural Organization of the United Nations.

"ALUMINIUM — ITS APPLICATION IN THE CHEMICAL AND FOOD INDUSTRIES"

By P. Junière and M. Sigwalt. 267 pages. Crosby, Lockwood & Son Ltd., London. 1964. £2.15.0

This is the English edition of a publication which has just been published in Germany and France.

It is hoped that the information contained in this book will help the food and chemical industries to extend their use of aluminium through choosing the right purity of alloy, in its correct temper and condition for the job, and the right design of plant, containers, etc., for that metal.

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EDITORIAL...

(Continued from page 193)

taining product temperature. He will know its refrigeration capacity in B.t.u./hr. which was measured under certain specified test conditions and can by experience be related to conditions in the particular store situations. In the testing of the prototype, power consumption (KWh/24 hr.) and per cent running time were established and this information too would be accessible to the purchaser.

Availability of these data to future buyers of these cabinets will therefore provide a rational basis on which they can select the unit best suited for their purpose.

In order to be meaningful, performance data of this nature are obtained from test conditions closely specified. It was the committee's task to determine which were to be the conditions during testing to be meaningful for Australian conditions of cabinet usage. The draft provides that cabinets be shielded from air currents during testing, because testing in moving air would require elaborate and expensive testing facilities and consistency in test results would be difficult to attain.

The draft is drawn upon the basis

- (1) product temperature in the cabinet shall not be above 0°F (-18°C);
- (2) the temperature of product placed in the cabinet shall not be above 0°F;
- (3) temperature fluctuations on the surface of packages at any point within the load limits shall not exceed $\pm 2^\circ\text{F}$ (1°C).

In short, the cabinets for which the specifications have been drawn up are not designed to pull down the temperature of produce placed into them.

In submitting the draft for public review the committee recognized that some existing cabinets

might not meet the requirements proposed, but members hoped that the provisions of the standard would be progressively adopted over a transition period.

The standard would, of course, be just as useful if it were decided that a higher temperature should be selected in order to meet present conditions. Now to the *Draft Regulation* which was drawn up by a Sub-committee of the N.H. & M.R.C. Food Standards Committee (see this Journal, 1965, p. 10).

According to this draft storage or display units in retail premises for use with all frozen foods must be capable of maintaining a steady temperature of 0°F, as tested by methods laid down by Specification of the Standards Association of Australia.

The Draft groups frozen foods in two categories. Category I comprises fruits, vegetables, fruit juices; fish and other freshwater and marine products; poultry; pre-cooked foods and pastry products. Category II includes edible meat and offal derived from cattle, sheep, pigs, and egg pulp.

During delivery to the retailer the highest temperature which a frozen food of Category I will be allowed to attain will be 10°F, but 48 hours after receipt in retail premises or display unit the highest product temperature must not exceed 5°F.

As regards the earlier temperature history of these foods, the draft regulation prescribes 5°F as the maximum temperature in the processor's and other non-terminal stores, allows a rise to 10°F on delivery to the *terminal store* which is defined as the last bulk cold (frozen) storage facility in which the food is held prior to distribution to retailers.

The draft incidentally also requires frozen foods to be returned to 5°F 48 hours after having been received into such terminal stores.

As regards foods of Category II, the maximum temperature is fixed

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INDUSTRIES IN AUSTRALIA

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*Editor: F. H. REUTER,
Ph.D., F.R.I.C.
F.R.A.C.I.
Associate Professor of
Food Technology,
The University of
New South Wales,
Sydney.*

Committee of Management:
F. S. BRADHURST, Chairman,
S. M. ADAMS,
R. F. EAGLE,
A. R. HOBBS,
F. H. REUTER.

Office:

12 O'CONNELL STREET, SYDNEY, N.S.W.

•

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at 20°F at all stages from processor to retailer.

The Draft Regulation incidentally plans to cover the thermal history of frozen food from manufacture until it is sold in retail or used in catering establishments.

At this stage of drafting, the regulation will apply:—

- (1) to places in which frozen food is sold;
- (2) to food service establishments in which frozen food is used in the service of meals or refreshments for sale;
- (3) to places in which frozen food for sale is prepared, processed, packed, re-packed or stored prior to transport or sale, and
- (4) to vehicles used for the transportation of frozen food for sale.

Food service establishments includes restaurants, cafes, cafeterias, coffee shops, diners, milk bars, sandwich shops, caterers, hotels, motels, clubs, guest houses and all other public eating or drinking places.

Not only does the draft propose to require maintenance of product temperature on food service premises, but it also proposes to make it an offence for any person to receive into any place or into any food service establishment, frozen food for sale or service the product temperature of which exceeds that prescribed in Schedule I for that particular frozen food.

It will be interesting to see what changes industry's review of the draft regulation under uniform procedure will bring about. In this regard it should be noted that this is the first time that a draft regulation did not originate within the C.A.F.T.A. organization. In this instance C.A.F.T.A. failed to produce a draft and N.H. & M.R.C. had to set up its own machinery to produce one. It is this document which is now being referred to C.A.F.T.A. for comment. Being now offered for review under uniform procedure will give industry a chance to work on it until it will be ready for the consideration of the F.S.C.

It will be particularly interesting to see whether industry will agree to the provision of the present draft that frozen food in bulk which is intended to be repackaged for sale in smaller packages may be thawed for such purposes, provided that the repackaged frozen food be returned immediately thereafter to the product temperature prescribed in Schedule I of the Standard. This would legalize a practice which is hardly in keeping with modern thinking.

In C.A.F.T.A.'s uniform procedure machinery this document should have the standing similar to that of a first T.S.C. draft. However, there is a difference: in this instance there is an element of compulsion to attend to its finalization.

Obviously steps must be taken to co-ordinate the two drafts and this will require decisions of policy. When finalized these documents will serve as guide lines and could profoundly influence the economics of frozen food handling in Australia.

Here is a challenge for C.A.F.T.A. to take a lead and bring together all those concerned with these matters.

REMOVAL OF RADIO-ACTIVE FALLOUT

A joint research programme is being carried out by the U.S. Department of Agriculture, and the National Canners' Association to find methods of removing fallout material from raw fruits and vegetables before canning and freezing. There is no hazard now or in the foreseeable future, but it is held that there is a need for a standby method which processors could use in an emergency.

The research is being undertaken at the N.C.A.'s laboratory in Berkeley, California.

I always like to hear a man talk about himself because then I never hear anything but good.

— Will Rogers



ANNOUNCING

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A completely new range of powdered flavours, marketed under the name of "Silkron", is now available to the Australian Food Manufacturing Industry.

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MELBOURNE • BRISBANE • ADELAIDE • PERTH

Banana Packers Fibre-King Plant

In consultation with the Queensland Committee of Direction (C.O.D.) of Fruit Marketing at Brisbane's new Sherwood Market, Packaging Engineering Section, experts of Australian Paper Manufacturers Ltd. have designed and supervised the installation and commissioning of Australia's fastest and most up-to-date banana packing plant.

The plant — one of the company's Fibre-King range, capable of filling and handling more than 2000 fibreboard containers a day — was recently put into operation.

The plant was built by R. L. Windsor & Son Pty. Ltd., Brisbane. The C.O.D., is the largest single packer of bananas in Australia.

With the new plant at Sherwood, both *Tropicana* and *Naturipe* grades of fruit are now being packed in fibreboard cases.

Growers deliver bananas in the bunch direct to the packing plant at Sherwood.

The first operation at the plant is the de-handing process during which the large, unwieldy bunches are broken down into hands of about 14 to 20 pieces of fruit.

The bananas are also graded for size before passing through the washing process which removes pests, dirt and sap. The washing plant has a recirculatory water supply and a special filtration system.

After draining, the fruit is graded into the two quality grades *Tropicana* and *Naturipe* and placed in process baskets — each containing one size of each grade of banana — and taken by conveyor to the upper floor for packing and sealing.

En route, the bananas pass under a flow of wax, which imparts greater shelf life and enhances appearance.

Packers place the fruit in ready-made fibreboard containers in an interlocking pattern to avoid bruising.

Each packer handles only one size of each grade, and packing is done on a scale so that each case is packed to the correct weight. Fresh containers are supplied to the packers by a continuous chute.

The packed cartons are sealed in a Fibre-King, before being conveyed to the ground floor where they accumulate on a gravity conveyor before being stacked on to pallets for despatch or loading into the ripening rooms which surround the plant.

QUEENSLAND BUTTER IN TUBES

Butter will soon be marketed in aluminium tubes which squeeze like toothpaste. Honey has already appeared on the market in tubes.

This is one of the latest moves in the dairying industry's drive for a greater share of markets, both locally and abroad.

The Queensland Butter Marketing Board developed the new technique particularly for conditions and circumstances where the conventional butter pack is either unavailable or unsuitable. Initially the pack will be used by the Australian army, being less unwieldy than canned butter.

Mr. George Coombs, general manager of the Queensland Butter Marketing Board, said recently that tubed butter was made of the same products as ordinary butter, such as butter fat, skim milk and salt but did not contain water. It was entirely wholesome and the Board would give a two-year guarantee of soundness for the product under all climatic conditions.



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INDUSTRIAL DIVISION

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Food Research in Britain

The year 1963 was one of growth and progress for the British Food Manufacturing Industries Research Association. This was stated at the Association's annual general meeting held at the Park Lane Hotel, London, on May 27.

The Association now has in membership over 600 individual organizations, who contribute some £72,000 in subscriptions. This sum, augmented by £10,000 from statutory food boards, earned the Association just over £41,000 in government grant through the Department of Scientific and Industrial Research. The Association's total income of £148,500 included over £3,300 from overseas members (non-grant earning) and £9,700 in American grants for special research projects.

The Association's research programme covers a wide field, including:—

confectionery (flavour and aroma of chocolate and discoloration and keeping qualities of boiled sweets):

meat products (biochemistry of cured meat pigments, cooking quality of sausages and microbiological aspects of prepacked and other meat products), and

fruit and vegetable products (flavour taint from the use of agricultural pesticides and other chemicals).

Projects sponsored by statutory food boards include the prevention of browning of tomato sauce in canned herring packs (Herring Industry Board); the shelf-life of prepacked bacon (Pig Industry Development Authority); the prevention of browning in pre-peeled potatoes (Potato Marketing Board); the pre-packaging of cheese (Milk Marketing Board), and the thawing of frozen egg (British Egg Marketing Board).

MEAT QUALITY

The result of work recently done at the Low Temperature Research Station and elsewhere on the meat quality of broiler chickens has revealed little difference between the meat of these birds and that of poultry produced under other systems.

Comparisons from the point of view of drugs given to the birds have also been made but no significant difference has been found between broiler and roasting chickens produced on free range.

The Low Temperature Research Station has, in addition, been studying the shell strength of eggs and has so far found that battery produced eggs have shells no weaker than those produced in other conditions.

MEAT RESEARCH

It has been officially confirmed that the general subject of research into meat quality will come within the scope of two institutes, the Food Research Institute at Norwich and the Meat Research Institute, which are now being established. It is also intended that the work of post-harvest problems, including those of storage and transport, at present being carried out at the Ditton Laboratory, will be continued and enlarged at the new Food Research Institute.

PESTICIDES IN CEREALS

A study of how cereals can be if treated with various insecticides, and how much people can take in without harm was discussed at the third joint meeting of the F.A.O. Committee on Pesticides in Agriculture and the World Health Organization's Expert Committee on Pesticide Residues held in Rome in March, 1965.

National Health and Medical Research Council

POINTS FROM THE REPORT ON THE 58th SESSION CANBERRA, 29th-30th OCTOBER, 1964

VETERINARY PUBLIC HEALTH COMMITTEE

The following recommendations derived from the report of the Veterinary Public Health Committee were approved by Council.

ANTIBIOTICS IN AGRICULTURE AND FOOD PRESERVATION

It was considered that the previous Council recommendations (Report of 54th Session, p. 32; Report of 56th Session, p. 44) should be cancelled, and that the following Council recommendation (Report of 55th Session, p. 32) should be reaffirmed:—

"(i) That the problem of the use of antibiotics as preservatives in the fishing industry be examined carefully, and information should be sought from all available sources regarding the treatment of fish by ice with an antibiotic content of 5 ppm (including whether antibiotic is incorporated in the ice or added after the ice has been manufactured);

(ii) That in the meantime the current recommendation of the Antibiotics Committee 'that approval of the use of antibiotics for food preservation should be withheld until there is an adequate body of evidence to show that the potential hazards visualized are not important' should be reaffirmed."

BRILLIANT BLUE AND DETECTION OF ANTIBIOTICS IN MILK

It was considered that the previous Council recommendations (Re-

port of 54th Session, p. 30; Report of 55th Session, p. 32) should be replaced by the following statement:—

"Council strongly reaffirms that there should be a zero tolerance for penicillin in milk as detected by the most sensitive method available; and recommends that all States and Territories should require all antibiotic preparations for intramammary infusion to be marked with an approved dye, and as long as it is an approved food additive, Brilliant Blue F.C.F. can be used for this purpose."

HORMONES IN ANIMAL PRODUCTION AND IN THE POULTRY INDUSTRY

It was considered that the previous Council recommendation (Report of 53rd Session, p. 32) should be reworded as follows:—

"Having in mind that no definite assurance can be given of the absence of a public health risk from the consumption of treated meat, and in view of the fact that certain countries will not, on public health grounds, accept carcasses if the animals, including poultry, have been given oestrogens as an adjunct to fattening, the administration of oestrogens to livestock for other than therapeutic purposes, should be prohibited."

NUTRITION COMMITTEE

The Nutrition Committee is mainly working on a revision of the recommended dietary allowances for consideration by Council in 1965. The following statement from the

Nutrition Committee report was approved.

VITAMIN PREPARATIONS AND ATHLETIC PERFORMANCE

The addition of vitamins to food or the taking of vitamin preparations may improve health and performance when a faulty diet is consumed. However, a few vitamin components do not correct any fundamental defects in the overall pattern of the diet, and there is no value in adding vitamins to an already adequate diet.

The Council considered that when vitamin preparations improve athletic performance this is a reflection of the inadequacy of the diet. The concept that any well balanced diet is all that athletes actually require for peak performance has not been superseded.

FOOD ADDITIVES COMMITTEE

Council approved the following recommendations arising from the report of the Food Additives Committee:—

FOOD ADDITIVES*

Ascorbic Acid in Frozen Fish

Ascorbic acid should be permitted as an antioxidant on frozen fish fillets and frozen prawns in an amount not exceeding 400 ppm.

Diphenylamine

Diphenylamine should be permitted for use as a dip or spray for the prevention of superficial scald on apples and pears with a residue tolerance of 7 ppm.

***It should be noted that Council's approval of the use of an additive in a certain concentration in a specific food has no legal significance as regards industry's ability to employ this additive in the manufacture of this food. An additive can legally only be used after the appropriate State or Commonwealth food regulation has been issued. This will normally follow the preparation of an N.H. & M.R.C. Draft Food Standard by Council's Food Standard Committee. — The Editor**

Essences

Triacetin and brominated vegetable oils should be permitted for use in the preparation of essences.

Glucono Delta Lactone

Glucono delta lactone should be permitted as a leavening agent in pre-packaged dry cake and pastry mixes in an amount not exceeding 5 per cent of the weight of the flour in the mixture.

Imitation Smoke Essence

Imitation smoke essence prepared from oil of cade should be permitted as a flavouring essence provided that any product so flavoured may not be labelled as a smoked product.

FOOD ADDITIVES STANDARD

There were no amendments to this Standard until the present meeting.

The Food Additives Standard previously recommended by Council (Report of 52nd Session, page 28) and as now amended is shown in Appendix II.

Fumaric Acid

Fumaric acid should be added to Group III of the approved modifying agents in the Standard for Food Additives.

Lecithin

In Group IV of the Standard for Food Additives the name "*Phospholipids derived from natural sources*" should be substituted for the name lecithin.

Propylene Glycol Alginate

In the Standard for Food Additives the words "*excluding propylene glycol derivatives*" in Group I should be deleted.

CODEX ALIMENTARIUS COMMISSION

The Council considered that Australia's comments for consideration by the joint Codex Alimentarius Commission of F.A.O. and W.H.O. could only be presented and supported effectively by a person inti-

mately concerned with the working of the Food Additives and Food Standards Committees and with an intimate knowledge of the working of food legislation throughout the Commonwealth.

FOOD STANDARDS COMMITTEE

Council approved the following recommendations from the report of the Committee:—

F.A.O./W.H.O. CODE OF PRINCIPLES CONCERNING MILK AND MILK PRODUCTS

Council considered that the F.A.O./W.H.O. Code of Principles (Appendix III) concerning milk and milk products should be endorsed.

FOOD STANDARDS

Canned Foods

Council considered a request that consideration be given to the preparation of a Standard governing the manufacture and processing of canned foods in general, but concluded that such a Standard was not warranted.

Cocoa and Chocolate (Hollow Moulded Goods)

Clause 7(b) *Hollow Moulded Goods* in the Standard for Cocoa and Chocolate (Report of 54th Session, page 41) was reviewed in the light of the definition of milk chocolate as proposed by the Expert Committee on Cocoa Products and Chocolate of the Codex Alimentarius Commission. Council considered that as the definition in the Codex proposal was not complete and as several States have already adopted clause 7(b), no alteration should be made at present.

It was also recommended that the Codex Alimentarius Commission should be requested to prepare a standard for hollow moulded goods and that the request should be accompanied by the arguments advanced for and against clause 7(b).

Coconut and Confectionery

Council recommended that the Standard for Coconut and Confectionery as set out in Appendix IV

be forwarded to the States and Territories for adoption.

Fish and Fish Products

Council recommended that the Standard for Fish and Fish Products should be amended by the addition of a recommendation on Fish-marinades or Fish Semipreserves and that the amended Standard, as set out in Appendix V, be forwarded to the States and Territories for adoption.

Fish Paste

Council considered a request that provision for a fish paste of lower fish content than presently allowed be made in the currently recommended Standard for Canned Fish Products (Appendix VI) but recommended that the present Standard should not be altered.

Ice Cream and Related Products

Council recommended that clause 1(c) of the Standard for Ice Cream and Related Products, as set out on page 51 of the Report of the 55th Session, be amended to read:—

"The use of farinaceous matter, except as permitted in clause 6, in the preparation of ice cream is prohibited."

Lemon Butter, Fruit Flavoured Spread and Fruit Flavoured Filling

Council recommended that the Standard for Lemon Butter, Fruit Flavoured Spread and Fruit Flavoured Filling, as set out on page 51 of the Report of the 55th Session, be replaced by the Standard set out in Appendix VII, and be forwarded to the States and Territories for adoption.

Margarine

It was recommended that, in clause 2 of paragraph 1 of the Standard for Margarine, the words "*mono or diglyceride emulsifiers*" be amended to read "*mono or diglycerides of fat-forming fatty acids*". The amended Standard is set out in Appendix VIII.

Metals in Food

Council recommended that the Standard for Metals in Food be amended by:—

- (i) the insertion immediately after the entry "Copper in beverages" of the entry — "Copper in Ghee — 0.15 ppm calculated as the metal".
- (ii) the replacement of the final paragraph by the paragraph:—
"The proportions here specified refer to the total contents of the container and, for the purposes of analysis, a representative proportion of the sample shall be taken".

The amended Standard is set out in Appendix IX.

Standard for Sugar and Glucose — clause 4, see Appendix XII.

Sour or Cultured Cream

Council considered a request that sour or cultured cream, with an 18 per cent fat standard, should be permitted to be sold under that name, but recommended that the applicant be informed that sour or cultured cream containing 18 per cent fat should be labelled Sour (or Cultured) Light (or Coffee) Cream.

Vitamins and Minerals

Council recommended that the Standard for Vitamins and Minerals approved by Council in 1962 (Report of 54th Session, Pages 42, 43) be amended by the addition of the following to Table 1 Part 1:—

Substances	To be calculated as	Average daily allowances
*Vitamin B ₁₂	Micrograms of	2 micrograms
Cyanocobalamin	cyanocobalamin	
*Limited to milk substances of vegetable origin.		

Prescribed Methods of Analysis for the Determination of Crude Fibre in Chocolate and Crude Fibre in Cocoa Paste and Cocoa

It was recommended that the prescribed methods of analysis as received from the Royal Australian Chemical Institute and listed in Appendix X be forwarded to the States for inclusion in the appropriate Standards.

Prescribed Methods — Deletion from Certain Standards

Council recommended that the words "when determined by the prescribed method" be deleted from the following Standards currently approved by Council:—

- Standard for Canned Fish Products — clause 5(b), see Appendix VI.
- Standard for Cocoa and Chocolate — clause 7(b), Report of 54th Session, see p. 41.
- Standard for Coffee — clauses 8 and 9, see Appendix XI.
- Standard for Skim Milk — Clause 1, Report of 54th Session, see p. 38.

and the following to Table 2.

Foodstuff	Reference Quantity
Invalid foods	2 oz.
Milk substitutes of vegetable origin (diluted according to label) . . .	1 pint

TERMS OF REFERENCE

The Council was firmly of the opinion that labelling is a necessary corollary of food standards and quality and it is essential that it shall be on a uniform basis throughout Australia. Council therefore recommended that confirmation be requested from the appropriate authorities that the functions of the Council include the making of recommendations on all aspects of food legislation, including standards, labelling and packaging.

The following are set out in full in Appendices to the Report:—

Recommended Standards for Food Additives; Code of Principles Concerning Milk and Milk Products; Standards for Coconut, Fish and Fish Products, Canned Fish Products, Lemon Butter, Fruit Flavoured Spread and Fruit Flavoured Filling, Margarine, Metals in Food, Coffee, Sugars, Glucose, and Prescribed Methods of Analysis.

FOOD ANALYSTS REFERENCE SUB-COMMITTEE

"To consider matters concerning methods of analysis of foods and food additives referred to the Sub-Committee by the Public Health Advisory Committee and to make recommendations to the Public Health Advisory Committee."

Membership until 31st December, 1966:—

Dr. D. B. Travers, Commonwealth Department of Health, Chairman; Mr. J. Warry, Commonwealth Department of Health, Convener, and Food Analysts from each State to be nominated by the State Director-General of Health.

PACKAGING ASSOCIATION IN GOVERNMENT TALKS

The National Packaging Association of Australia was negotiating with the Commonwealth Government over proposed standardization

and marking of packaged goods in Australia, said Mr. C. R. E. Warren.

Mr. Warren, who is N.S.W. manager of I.C.I.A.N.Z. Films Division, was recently re-elected national president of the N.P.A. for his third term.

He said negotiations with the Government were part of the N.P.A.'s programme to act on behalf of the packaging industry on broad issues.

The final regulations would be of vital concern to every manufacturer in Australia.

Mr. Warren added that the proposed standardization would be discussed at the N.P.A. annual forum being held in Adelaide from May 17-21.

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BOOK REVIEWS

- *"ISRAELI COOKING"*, by LILIAN CORNFELD, 356 pages. The Avi Publishing Co., Inc., Westport, Conn. 1962. \$5.70.

In an age where a great many cookery books depict a rather stereotyped French Cuisine, or many a cake or dessert that closely resembles a spring hat, it is a pleasant experience to read a cookery book where cooking happily resides in its rightful place. For this is a cookery book of real people and the recipes are so obviously created as a result of climate, custom, tradition and availability of foodstuffs. This is the sort of cookery book to keep one company beside a warm fire on a cold winter's eve, because even without all the author's comments and asides, the recipes themselves tell a geographical and historical story. Some few of the dishes most Australians would hesitate to reproduce because they would seem to be out of accord with the Australian palate, but most, where the foodstuffs are available, appear to be delicious, easy to prepare, sustaining and health-giving and above all, part of the life of the peoples they represent.

In our sophisticated and showy age where women want quick, easy but glamorous and elegant dishes to cook for their guests it is a nice experience to come across a cook-book which puts cooking in its true place. In this book it has the warmth and realness of living people affected by climate custom, availability of foodstuffs, etc. This is the sort of cookery book to go early to bed with or to sit up late by a warm fire, for every page is alive with people. Many of the dishes most Australians would not wish to make because they seem unpalatable, many of the ingredients we simply could not get but many of the dishes are "*from the Israeli people to us*", are practical

and just a bit different. There is only one valid reason for people to entertain and that is to give and receive of each other so that although many of these recipes may at first appear to be unsophisticated by *French Cuisine* standards, they are in fact an ideal gift for our friends eating.

Reviewer: Gretta Anna Tep-
litzky of the Gretta Anna School
of Continental Cooking, Sydney.

- *"COMMERCIAL METHODS OF ANALYSIS"*, by F. D. SNELL and F. M. BIFFEN. Revised Edition. 753 pages. Chemical Publishing Company Inc., New York. 1964. \$12.00.

This is a revised edition of a well known volume originally published in 1944. Its stated purpose is "*to show the method of approach to the analysis of complex commercial products*". It aims to cover the major topics encountered in commercial analysis and, within its scope, may be described as a comprehensive introduction to the subject.

After opening chapters on essential chemical apparatus, techniques, and a brief discussion of routine preliminary procedures, some thirty classes of products are discussed including ferrous and non-ferrous alloys, cement, minerals, products of the paint and plastics industry, saponifiable oils and derived materials, petroleum products, greases, paper and textiles, to mention only a few. Tests for the qualitative identification of individual components as well as methods for their quantitative determination in mixtures are given in each chapter. Procedures for the determination of physical and chemical constants are also adequately covered.

Valuable comments on the limitations of the various methods are

frequently given in the text and the authors do not hesitate to emphasize early in the book that in commercial analysis an estimate of the required degree of accuracy with which an individual component has to be determined, plays an important part in the selection of a method. For this and other reasons, alternative methods are often detailed. This is good advice, especially for new practitioners in the field.

As stated in the preface to this edition the authors have decided not to include references to more modern techniques such as infra-red spectrophotometry and gas chromatography. This is an understandable limitation, and the book highlights the fact that a very large number of analyses can still be successfully completed by conventional means and methods. The book should prove a valuable stand-by for the commercial analyst.

Reviewer: L. Martin, Commonwealth Laboratory, Department of Customs and Excise, Melbourne.

- **"MILESTONES IN NUTRITION"**
by S. A. GOLDBLITH and M. A. JOSLYN (Eds.). (*Anthology of Food Science*, Vol. 2.) 797 pages. Avi Publishing Company, Westport, Conn., 1964. \$15.25.

Students of nutrition, of all ages and at all levels, will be greatly inspired on reading *"Milestones in Nutrition"* and will applaud the fact that the authors' choice for a second volume of *"An Anthology of Food Science"* has been on the subject of nutrition. The book contains primarily a selection of the classic papers on the vitamins, their discovery, relationship to various deficiency diseases, the elucidation of chemical structures and metabolic roles. The review papers included are concerned with the vitamins and some other aspects of nutrition such as metabolism. The volume contains also a few of the classic papers relating to amino acids and proteins and to minerals in nutrition.

On first glance at the table of contents for a book entitled *"Milestones in Nutrition"* there appears to be an over-emphasis on the subject of the vitamins and consequently omissions of other important aspects of nutrition. However, the dedicatory foreword and the authors' comments fully explain the basis for the choice of papers.

Readers will agree that the papers selected were all important contributions in certain fields of work that have helped lead up to the present understanding of nutrition. This collection gives a stimulus to reading not only these original papers but others of this period and an appreciation of the magnitude of the vision and the meticulous work of these early investigators. The importance of each contribution is particularly illuminating to those who vainly attempt to read the mass of current literature on the subject of nutrition.

The review paper by Graham Lusk on *"A History of Metabolism"* is in itself a sufficient stimulus to further reading of the work of the pioneers of nutritional science. This book is to be recommended as a source of great interest and pleasure to all who have some knowledge of science. Perhaps this may lead to a better understanding of the place of nutrition as a subject integrated with other pure and applied sciences and help to emphasize the importance of nutrition to the health and well being of the peoples of the world.

Reviewer: (Mrs.) A. Cahn, Russell-Grimwade School of Biochemistry, University of Melbourne.

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VOL. 37, No. 3, MARCH, 1962

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MEAT TENDERIZERS — NO HEALTH HAZARD

In a written answer to a question in the House of Commons from Mr. George Darling, M.P., about the practice of tenderizing beef by injections prior to slaughter, the Minister of Agriculture, Fisheries and Food, the Rt. Hon. Christopher Soames, C.B.E., M.P., said: *"The Food Standards Committee have advised me that they can see no hazard to human health from the consumption of meat tenderized by the pre-slaughter injection of papain. The Committee also considered the question as to whether its use on meat is deceptive to the consumer and have advised that provided meat so treated is labelled, the practice is unobjectionable."*

"I accept their advice and propose to provide accordingly when the Labelling of Food Order is revised following the Committee's current review of labelling generally."

Papain is an enzyme extracted from the paw-paw fruit. When applied to meat, it acts on the protein molecules during cooking and makes the meat more tender than it would otherwise have been. It has been used in this way widely and for a long time but is only effective near the surface. A recently-introduced process consists of injecting a concentrated preparation of papain into an animal's blood system via the jugular vein about half an hour before slaughter. The blood distributes the enzyme throughout the body tissues so that if the animal is slaughtered soon after treatment all the meat contains small quantities of the enzyme which tenderizes all the tissues when the meat is cooked. The treatment can only make meat more tender; it does not alter its appearance or flavour.

The liver, kidneys and tongue of a treated animal tend to disintegrate on cooking because of their higher enzyme content and are therefore

usually sold for manufacturing purposes where special processes can be employed or where they can be included in products which do not require the meat to retain the original shape. The enzyme does not survive normal cooking.

The injection process has been used in the U.S.A. for some time and the U.S. food and drugs legislation recognizes papain as an ingredient which can be used in any food without limitation.

VACUUM-SYRUPER

The primary object of the present invention is to provide for creating partial vacuum in each can of a syruping apparatus for removing most of the air and at the same time inducing syrup or brine to flow into the can.

The apparatus functions in a way that prevents syrup being admitted to each can until after the can has been subjected to partial vacuum and the vacuum passages closed so that there can be no carry-over of excess syrup into the main passages leading to the source of vacuum. This permits syrup of any suitable temperature to be used while at the same time the possibility of undesirable foaming is either eliminated or reduced to a minimum. An important feature of the invention is that the apparatus includes a series of filling heads, each of which is adapted to trap any condensate or moisture in the outgoing stream from each can and to automatically return it to a main bowl.

Syruping Apparatus for Use in Connection with the Canning of Fruit, Vegetables and Other Food Products. D. W. Bingham, to D. W. Bingham & Co. Pty. Ltd. (Brighton, Vic., Australia). U.S. Patent 3,139,914, issued July 7th, 1964.

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TRENDS IN U.S. FOOD PRODUCTION, CONSUMPTION AND DISTRIBUTION

The Americans — 190,000,000 strong — are buying food at the rate of \$400 per person per year. This corresponds to about one-fifth of their average annual income, considerably below the proportion of income spent for food in Western European countries, viz. about one-third. Yet despite the fact that the food industry is their largest industry, less than one per cent of its total sales income is devoted to research and development. In part this is because food research is supported by government agencies, particularly, the U.S. Department of Agriculture and the Department of Defence, and by the industries concerned with agricultural and food chemicals, plastics, processing equipment, and packaging materials.

New products developed in government laboratories enter the public domain and hence present no possibility for exclusive exploitation. Some critics have proposed that taxpayers' funds be directed toward more basic, long-term research rather than toward immediate practical objectives. Incentive for product development on the part of industry derives in large measure from the advantages of patent protection with its opportunity for temporary monopoly. Hence some major food companies are known to be directing their scientific resources toward the development of non-standardized food products which also permit some degree of exclusivity.

The *Economic Research Service* of the U.S. Department of Agriculture has reported a steady increase for more than a decade in the consumption of meats and poultry products, processed (canned, dried, etc.) fruits and vegetables, and milk

products, with a corresponding drop in relative consumption of cereal and grain products, fresh fruits and vegetables, potatoes, and sweet potatoes.

Among the technological methods for food processing currently receiving greatest attention are dehydro-freezing, freeze-drying, and vacuum-puff and foam mat drying. The latter processes are being developed for orange, grapefruit, and tomato juice. Omelet mixes are about to join the *instant* parade along with bulgur, a parboiled form of wheat. Freeze-dried meat cubes, mushrooms, and vegetables are finding their way into soup mixes, despite their present relatively high cost, while similarly processed shrimp is being used in chow mein and creole. In the packaging field, progress is being made in the development of edible protective coatings and packaging films. A recent report presages the advent of packaged hard boiled eggs.

From the standpoint of the American consumer the major trend in food research and development is toward time- and labour-saving *convenience foods*. However one must not lose sight of the fact that on a world basis food production is far behind present needs. In light of the virtual certainty that the rate of population growth is exceeding that of agricultural production the prospect that man will one day have to resort to non-agricultural raw materials for food, as well as for fibre, is not at all a remote one.

Automation and computers have already made significant inroads in food processing and distribution. About to appear in many parts of the country are roadside diners where food orders phoned in by patrons, are stored in a computer and

electronically signalled to cooking devices in automatic kitchens from which assembled meals are delivered together with appropriate checks. Chefs and waitresses may be facing competition from the robot but cashiers are probably here to stay.

From "What's New in Food and Drug Research".

BETTER STORAGE

H. J. Heinz Co. Australia Ltd. has gained a 20 per cent saving in cold store space by switching from paper to polythene sacks for storing semi-processed vegetables.

The polythene allows 62 filled sacks weighing from 50 to 60 lb to be stacked where 38 paper sacks

were stacked previously. The less bulky packs are possible because the polythene sacks can be filled with vegetables and then frozen, instead of freezing the vegetables and then packing them. The vegetables are packed and then frozen in trays 2 in. deep to give a flat pack which is not only smaller in bulk but also a little lighter to handle.

IRRADIATION OF FOOD

The use of food irradiation in developing countries was the subject of a panel of the International Atomic Energy Agency when it met in Vienna from 3-6 August.

Mankind must abolish war or war will abolish mankind.

— John F. Kennedy

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THE SPRAY DRYING OF MILK

A Winter School

The University of New South Wales, Department of Food Technology, in association with The Australian Society of Dairy Technology will hold a one week residential course from Monday, 17th to Friday, 21st May, 1965.

The rapid growth of the Australian milk drying industry has brought with it certain problems in the dissemination of technical information. This course has been designed to offer dairy companies ready access to current thinking and technical progress in the spray drying of milk. A special feature of the course will be the emphasis given to the techniques required to produce powders which meet close specifications.

The course will be of most use to dairy plants which manufacture dry milk products or plan to do so. It is especially directed to technical personnel in these industries. It will also be of interest to personnel in the ancillary industries which serve the dairy industry. It is desirable, but not essential, that those attending the course should have reached at least the level of the Werribee Diploma in Dairying.

Lecturers will be drawn from the University of New South Wales, C.S.I.R.O. Division of Dairy Research, industry, and Departments of Agriculture.

Enquiries: Enquiries should be directed to Associate Professor F. H. Reuter, or Dr. P. M. Linklater, Department of Food Technology, P.O. Box 1, Kensington, N.S.W.

Charges: The fee for the course is £6.0.0.

Accommodation has been reserved at Basser College for participants of the course, from lunch time on Monday, 17th May, to lunch time on Fri-

day, 21st May. The cost is £16/10/-, all meals included.

Charges for fees and accommodation are payable in advance to the Cashier, The University of New South Wales, P.O. Box 1, Kensington, N.S.W. The names of representatives should be clearly stated.

Limitation of Numbers: The facilities available for the course are limited and it has been necessary to place an upper limit of 25 on the number who can be enrolled. Applications will be accepted as they are received.

Closing Date for Receipt of Applications: 26th April, 1965.

PROGRAMME

MONDAY, 17th MAY:

p.m. (1) Introduction. Professor F. H. Reuter, Department of Food Technology, University of N.S.W. (2) "Dried Milk Products in World Trade", D. W. Crowfoot, N.S.W. Department of Agriculture, Sydney. (3) and (4) "The Use of Evaporators in the Dairy Industry", R. F. Barter, Bryant Bros. Pty. Ltd., Sydney.

TUESDAY, 18th MAY:

a.m. (1) "Fundamentals of Milk Drying", Professor F. H. Reuter, Department of Food Technology, University of N.S.W. (2) and (3) "The Use of Driers in the Dairy Industry", W. A. Woodroffe, James Bell Machinery Co., Sydney.
p.m. (4) "Instrumentation in Milk Evaporators and Driers", W. R. Day, Department of Food Technology, University of N.S.W. (5) Demonstrations: Instruments.

WEDNESDAY, 19th MAY:

a.m. (1) "The Use of Separators and Homogenizers in Dairy Plants", A. H. Marsh, Alfa Laval Separator Co. Pty. Ltd., Sydney. (2) "The Effects of Heat on Milk", Dr. P. M. Linklater, Department of Food Technology, University of N.S.W. (3) "Chemical Standards of Raw Materials and Finished Products", F. J. Stone, Peters Creameries Pty. Ltd., Sydney.
p.m. (4) "Insect Control", Department of Entomology, University of N.S.W. (5) "Problems of Packaging and Storage", Dr. R. A. Edwards, Department of Food Technology, University of N.S.W. (6) Demonstrations: Recombined milk products.

THURSDAY, 20th MAY:

a.m. (1) "The Application of the Fundamental Principles of Microbiology to the Dairy Industry". (2) "Specific Bacterial Problems in the Condensing and Drying



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of Milk Products", Miss B. Keogh, C.S.I.R.O. Division of Dairy Research, Highett, Vic. (3) "The Microbiological Structure of Dairy Products", Dr. N. King, C.S.I.R.O. Division of Dairy Research, Highett, Vic. p.m. (4) "Heat Treatment for Special Products", R. A. Buchanan, C.S.I.R.O. Division of Dairy Research, Highett, Vic. (5) "Milk Powder for Re-combined Products", L. L. Muller, C.S.I.R.O. Division of Dairy Research, Highett, Vic. (6) Demonstrations: Evaporation and Drying.

FRIDAY, 21st MAY:

a.m. (1) "Plant Sanitation", C. Bavan, Victorian Department of Agriculture, Melbourne. (2) "Special Dried Milk Products", R. A. Buchanan, C.S.I.R.O. Division of Dairy Research, Highett, Vic. (3) General question period and summing up. (Morning and afternoon tea will be served between lectures.)

SCHOLARSHIPS

In 1965 two undergraduate scholarships in Food Technology at the University of New South Wales have been awarded to the following students:

Alexander N. Brennan — "G. I. Adcock Scholarship". Leaving Certificate results: (Knox Grammar School) English A; French H2(o); Mathematics I A; Mathematics II A; Physics A; Chemistry H1.

Ian D. Dowman — "Unilever Australia Pty. Ltd. Scholarship". Leaving Certificate results: (Sydney Technical High School) English A; Modern History A; Mathematics I H1; Mathematics II A; Physics A; Chemistry H1.

QUEENSLAND VEGETABLE FREEZING

The first frozen vegetable processing factory in Queensland is expected to begin operations at Hamilton in Brisbane in June.

It will be a joint venture by the Poultry Farmers Co-operative Society Ltd., the Red Comb firm, and Dobson's Foods Ltd., one of the largest food processing firms in New Zealand.

The project will be operated by a new company, Frozen Products (Q.) Pty. Ltd.

Personal . . .

Dr. D. Martin of the C.S.I.R.O. Division of Plant Industry has had conferred upon him an Associateship of Honour of the Royal Horticultural Society of London.

Dr. Martin is Officer-in-Charge of the Tasmanian Regional Laboratory, Hobart.

The Associateship is awarded to "persons of British nationality who have rendered distinguished service to horticulture in the course of their employment".

It is the highest honour given by the Society to British persons not resident in the U.K.

For many years Dr. Martin has led a research team in Tasmania on investigations into the relationship between orchard conditions, fruit size, and keeping quality in apples.

His research findings have given a much clearer understanding of the basic physiology of apples, how this is affected by cultural practice and its important bearing on the problems of apple storage.

Dr. Martin is also well known for his knowledge of eucalypt ecology and taxonomy. He has made a special study of eucalypts introduced to Britain, Ireland and parts of North America.

Miss R. A. Sherwood, who graduated B.Sc. last year from the University of New South Wales, has been appointed to the C.S.I.R.O. Division of Food Preservation where she will assist in experimental studies of the properties and structure of bacterial spores, and in investigations of the microbial spoilage of foods. Miss Sherwood spent last year at the Biochemistry Department of the University of New South Wales working on mechanisms of oxidative phosphorylation.

A little of what you fancy does you good, but a lot of nothing else does you in.

—Elsbeth Huxley in "Punch"

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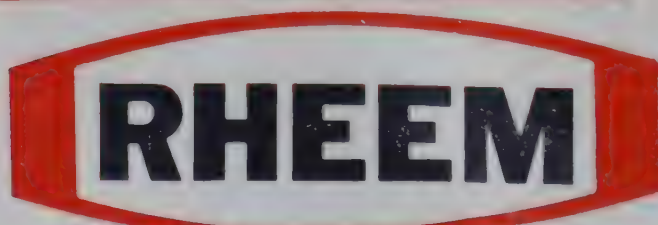
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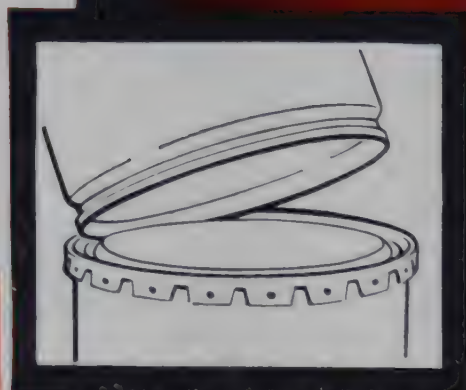


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Overall Length	22 $\frac{3}{8}$ "	26 $\frac{3}{4}$ "
Inside Diameter	14"	14"
Overall Diameter	14 $\frac{7}{8}$ "	14 $\frac{7}{8}$ "
Approx. Wt. 22 gauge	11.8 lbs.	13.4 lbs.
Approx. Wt. 24 gauge	9.8 lbs.	11.1 lbs.
Shipping Measurement	2.86 cu. ft.	3.44 cu. ft.



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See how the necked-in bottom works. It speeds safety stacking, reduces storage areas and cuts costs all round.



PAPER SACKS FOR POTATOES

A series of trials conducted in Tasmania has established that paper sacks can be used successfully in the packing and transportation of potatoes.

This project was undertaken by A.P.M. and Bates (A'asia) Pty. Ltd., with the close co-operation of the Devenport merchants, Clements & Marshall Pty. Ltd., and the Tasmanian Department of Agriculture, and Mr. H. McKay, the Tasmanian Government's Senior Marketing Officer in Sydney.

The trials, which began in June last year, have also shown that the appearance of the produce at the marketing point is improved when paper sacks are used.

In the initial stages of the project, controlled tests were made to ascertain the practicability of packing and storing Tasmanian quality potatoes in special, high-wet strength paper sacks for extended periods.

Particular attention was given to finding out whether there was a need to ventilate the proposed sacks.

The tests proved completely successful and showed that ventilation holes were not necessary. After this was established trials were made using various sack specifications and methods of packing, closing, loading and securing in railroader containers.

The ideal sack size has now been selected, as well as the best stacking pattern to minimize freight costs.

The selected sack will contain 56 lb of potatoes compared with the heavy 150 lb in the existing jute sack. The smaller size facilitates handling and may ultimately become a bulk retail sales unit, especially with the improved printing obtainable on paper sacks.

Although some points still need final resolution, there are grounds for believing this is a commercial proposition which will assist the potato industry as well as the paper industry.

Plans are now being prepared to demonstrate this during the next Tasmanian season, reports "A.P.M. News".

Wine in Cans

Wine in cans practically the same size as those containing beer or soft drinks, recently made its appearance in Adelaide.

A smooth sea never made a skilful mariner.

— Unknown

REVUE FRANCAISE DES CORPS GRAS

(FRENCH REVIEW OF
FATS AND OILS)

THE OFFICIAL ORGAN OF
THE INSTITUTE OF
FATS AND OILS

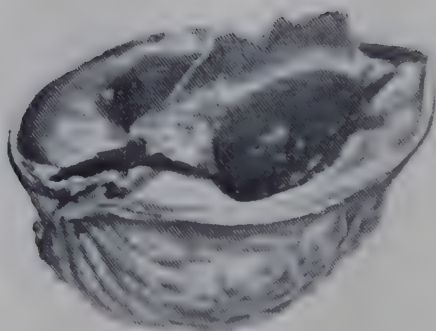
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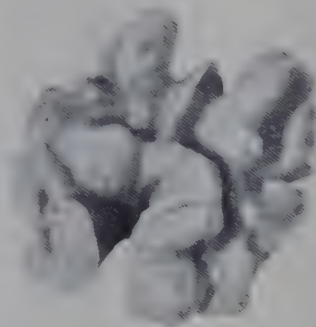
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THE MACADAMIA NUT —

A New Industry For New South Wales ?

The macadamia nut industry has not developed in New South Wales, although it has become a big industry in Hawaii with seed imported from Australia. The nut is a native of the big scrub areas of northern New South Wales and southern Queensland. Early settlers recognized its high quality. Many planted seedling trees in home orchards, and some attempted commercial production. The oldest known commercial planting in the State is in the Rous Mill district, planted about 1870 with seed from the Teven Valley.

The industry did not develop because seedling trees are not true to type. They produce nuts varying widely in quality. The best trees produce fruit with shells of even, medium thickness, and a high proportion of kernel to shell. The nuts should be smooth and attractive in appearance, round and big enough to cover a penny.

Improvement in the quality and uniformity of nuts could only be obtained by vegetative propagation from selected trees that produce high quality nuts. However, attempts by growers in New South Wales to multiply good types by cuttings or grafting failed. The problem was overcome in Hawaii, and to some extent in Queensland, but the methods used in those places were not successful in this State.

When the Tropical Fruit Research Station was established at Alstonville in 1959 an early project was the propagation of the macadamia. D. S. Leigh, Officer-in-Charge, has experimented with raising and selecting stocks, scion selection and treatment, times and methods of grafting and care of newly grafted plants.

Mr. Leigh has established suitable methods for grafting macadamia at Alstonville. His current trials are aimed at more accurately defining the best grafting time and treatment. The encouraging results obtained indicate that it is unlikely that difficulty in propagation will impede development of the macadamia industry in this State.

In 1954 the Department, with the help of a United States authority, the late Dr. J. H. Beaumont, surveyed macadamia trees growing on the north coast and selected about 100 of apparent high quality. Closer observation of the selected trees since 1955 has enabled the selected group to be reduced to fewer than 20 trees. These will be used as sources of scion wood if they continue to show the characteristics they were selected for.

From "The Agricultural Gazette", September, 1964.

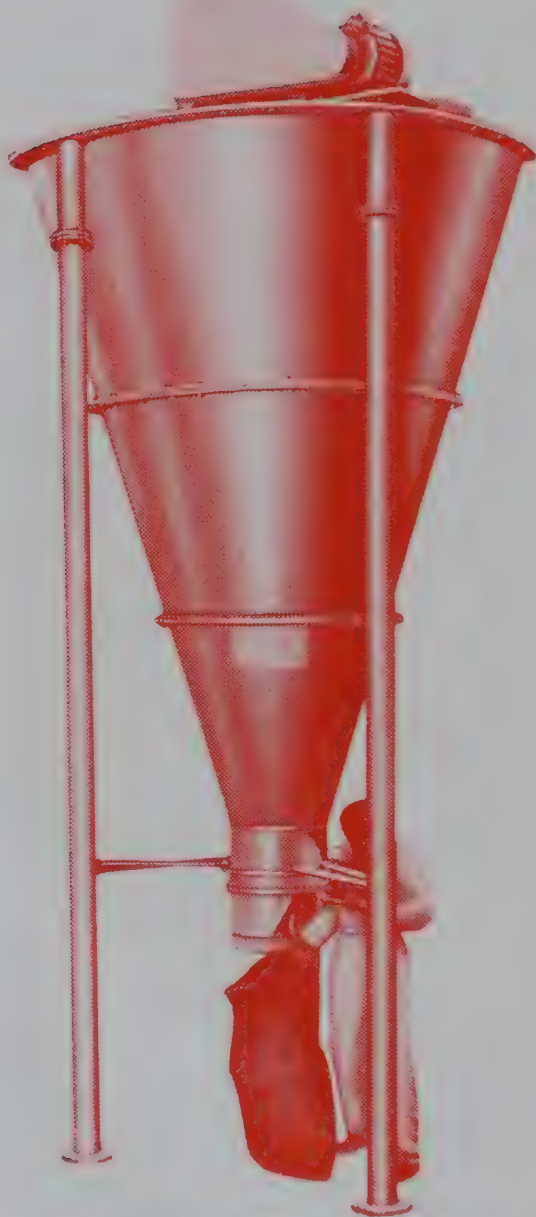
THE UTILIZATION AND DISPOSAL OF POTATO WASTES

An International Symposium on the Utilization and Disposal of Potato Waste will be held at the University of New Brunswick, Fredericton, New Brunswick, Canada, on May 24-26, 1965.

Speakers will review the present state of industrial practice and research concerned with the utilization and disposal of trade wastes, particularly from the processing of potatoes.

The Symposium will be organized and presided over by Dr. R. A. Gallop, Head of the Food Science Group of the New Brunswick Research and Productivity Council, formerly of C.S.I.R.O. Regional Laboratory, Hobart, Tasmania.

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Post-Processing Can Handling

Although heat processes have been developed that will insure the destruction of spoilage organisms normally present in canned food products, there remains the possibility of re-entry of spoilage bacteria during post-processing can handling operations.

The three main factors in spoilage resulting from post-processing can handling operations are:—

The condition of the can double seams,

the presence of bacterial contamination in cooling waters or on wet can runways, and

poor operation or adjustment of the filled can handling equipment.

The following recommendations will minimize the possibility of spoilage by recontamination following heat processing:—

1. Inspect can seams periodically to insure that they are properly formed.
2. Do not allow cans to drop into crates from closing machine discharge tables.
3. Do not overfill retort crates. This will eliminate protruding cans which could be crushed in the handling of the crates.
4. Prevent sharp impacts between filled crates or against guides or projections.
5. Operate crate dumps smoothly to prevent impact denting.
6. Replace all worn and frayed belting, can retarders, cushions, etc., with new non-porous material.
7. Run cans through a can drier immediately on leaving the cooling system or allow them to dry in the retort crates before discharging into the can handling unit to lessen the recontamination hazard. High velocity air blasts over the body and ends of cans remove excess water and maintain dry can tracks.

Dry conditions discourage the development of bacterial contamination.

8. Periodically inspect the can handling system from the closing machine to the caser. Where rough handling of the cans is apparent, smooth out the operation to minimize can seam damage. This is especially important where cans roll on their sides on can runways.

9. Chlorinate all cooling waters to a point where there is one part per million chlorine residual at the discharge end of the can cooler. If chlorination renders the water corrosive, use a suitable corrosion inhibitor.

10. All runways and belts which come in contact with the can seams should be thoroughly scrubbed at intervals frequent enough to prevent the build-up of dirt and organic debris. Spray the clean runways and belt with not more than 200 parts per million of a quaternary ammonium compound, as for example Roccal, or other similar material. Studies are under way to determine what other bactericides might be suitable for preventing excessive development of bacteria on the runways or belts.

The importance of sanitation in this area of the canning operation can not be over-emphasized.

From N.C.A. "Research Information", No. 83.

To be any good, in his youth at least, a scientist has to think of one thing, deeply and obsessively, for a long time. An administrator has to think of a great many things, widely, in their interconnections, for a short time.

— C. P. Snow,
"Science and Government".

STANDARDS

Methods for the Measurement of Fluid Flow in Pipes

B.S. 1042, Part 1: 1964. Orifice Plates, Nozzles and Venturi Tubes. £2/10/-.

Specifies the geometrical shape, relative dimensions, constructional requirements and accuracy of manufacture of square-edged, conical-entrance and quarter-circle orifice plates, nozzles (of I.S.A. 1932 profile), venturi nozzles and venturi tubes.

Information is given enabling a calculation to be made of rate of flow of homogeneous fluids in pipes of inside diameter not less than one inch; conversely, the calculation of dimensions of a device for metering a given rate of flow can be determined. Applicable to both compressible and incompressible fluids, to the flow of viscous liquids at low Reynolds number and to flow at high pressure differences (initial flow); not to fluids exhibiting non-Newtonian behaviour, to suspensions of solids in liquids or gases, to non-steady or pulsating flow or to flow in partially filled pipelines.

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Polythene Pipe (Type 710)

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Composition (extrusion compound and pipe material), dimensional characteristics, classification by pressure ratings, physical and chemical characteristics. Methods of test in appendices together with notes on the use of the pipe.

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B.S. 1133: Section 21:1964. 12/6

Detailed guidance on the different types now available, their properties and their suitability for par-

ticular applications is given in this new section of the British Standard Packaging Code, B.S. 1133.

In indicating the properties and most usual end-uses for each type of material, Section 21 also describes methods of manufacture and provides a number of test methods for significant properties of cellulose film and metal foil.

THE DETERMINATION OF 5'-NUCLEOTIDES

Since the flavour-enhancing properties of 5'-nucleotides have recently become apparent, and since present methods of analysis for these compounds are not suited for routine purposes, this investigation was undertaken to develop a method for the separation and quantitative determination of the following 5'-nucleotides in a variety of foods: cytidine-5'-phosphate, adenosine-5'-phosphate, uridine-5'-phosphate, inosine-5'-phosphate, and guanosine-5'-phosphate.

The procedure utilizes Dowex 1 ion-exchanger (formate form) to adsorb and concentrate the nucleotides from an aqueous extract of the food sample. The nucleotides are eluted in the above order by a water-formic acid-sodium formate eluent system. Although this procedure separates the 5'-nucleotides from each other, they are not separated from their corresponding 2'- and 3'-isomers. This requires oxidation with periodate and reaction of the oxidation products with 2,4-dinitrophenyl hydrazine to allow colorimetric determination of the 5'-nucleotides in the presence of the 2'- and 3'-forms.

H. G. Lento, J. A. Ford and A. E. Denton, Basic Research Dept., Campbell Soup Co., Camden, N.J. "J. of Food Science", 29, 435. 1964.

Good resolutions are simply checks that men draw on a bank where they have no account.

— Oscar Wilde

FREEZING AND STORING FISH

TORRY STATION STEPS-UP WORK

Increased concentration on freezing and cold storage work and a decrease in research on certain aspects of fish smoking and on other projects that have reached the stage of industrial viability are proposed for the 1964-65 programme for the Department of Scientific and Industrial Research establishment's Torry Research Station in Scotland.

This is proposed so that more laboratory time will be given in the immediate future to the problems of the inshore fishing industry and the shell fisheries.

Torry has developed a method of condensing the smoke used in smoking fish to give a liquid containing all the chemicals taking part in the smoking process.

Although the technique is only at the laboratory stage it offers a possible alternative to the further development of smoking kilns, but a drying stage will still be necessary.

The new smoke-dip solution is produced by heat decomposing (pyrolysis) wood in a restricted air supply. The sweet smelling smoke so produced is mixed with oxygen in controlled amounts and condensed to give a solution, which after dilution with water and the addition of salt provides a smoke-dip in which fish may be *smoked* by immersion.

Fish smoked in this way closely resemble traditionally cured fish because the new process is based on discoveries of the scientific principles operating in the smoking process. When a fish is smoked in a kiln, vapour from the wood smoke dissolves in the surface water on the fish forming a concentrated smoke solution. This slowly diffuses into the tissues giving the fish its characteristic flavour and enhanced keeping qualities.

COUNTER ODORANT

A counter-odorant method has proved most promising in eliminating the extremely unpleasant odours that waft from the chimneys of fish meal factories.

This latest method employs an aerosol of a specifically formulated chemical mixture that forms an odourless combination with the particular vapour in the chimney.

Previously trials with masking agents have given good results only up to a quarter mile range. Beyond that distance there has been a tendency for the drying chemical and the smell to separate out. The new technique is designed for use in conjunction with scrubbing equipment that first cools and washes the escaping flue gases with cold sea water.

SCAMPI

Scampi, the latest addition to the menu in many of Britain's restaurants has been the subject of a study by the Humber Laboratory of the Torry Research Station.

Scampi is a hard-shelled prawn which occurs in waters around England, Spain, France and Italy. In England it is commonly called Dublin Bay prawn, and derived the name of scampi from Italy where it is called scampo scampolo.

The prawn, before being peeled, can be as long as 14 inches, but only the meat from the tail is used.

Landings of scampi (the scientific name is *Nephrops norvegicus*) tend to be intermittent. Freezing is an effective way of ironing out gluts and shortages but little was known about the effects of freezing until the recent experiments. It has been found that if the tails — the edible bits — are quickly frozen and then thawed the meat can be readily removed from the shells. Without freezing its removal is often difficult and results in damage.

Provided they are kept in ice from catching to shore, and are then frozen to 20°F within 24 hours, scampi can be successfully stored for up to four months. Experiments are continuing to find if they can be kept for longer periods.

INTERNATIONAL FRUIT JUICE CONGRESS

The Sixth Congress of the International Federation of Fruit Juice Producers will take place from May 11 to 14, 1965, in Lucerne, Switzerland.

Apart from the specific contributions of a commercial, technical, scientific and propaganda nature, special attention will be paid to the health-giving properties of fruit juices. An exhibition and tasting of fruit juices as well as a demonstration of advertising techniques will be associated with the Congress.

The secretarial work for the Congress is being carried out by the office of the Schweiz, Obstverband (Swiss Fruit Union), Zug, to whom all applications for further information should be addressed.

FOOD COLOURS — NON-U

In July, 1964, the British Food Standards Committee recommended that six of the thirty colouring matters on the existing U.K. permitted list should be banned immediately and that approval of all but two of the remaining twenty-four colours should also be withdrawn if satisfactory evidence of safety-in-use were not produced within the next five years.

TO STUDY LATIN AMERICA'S FOOD TECHNOLOGY

The state of food technology in Latin America has been reviewed during a seminar held by the Food and Agriculture Organization in Campinas, Sao Paulo, Brazil, in November, 1964.

The seminar reviewed the technical, economic and educational aspects of processing, preserving, packaging, transporting and marketing food. It was the first seminar of its type that F.A.O. has sponsored in Latin America, and twenty-two food technologists from 18 nations, plus 10 observers from various international organizations attended.

The agenda included such topics as the availability of raw products for processed foods, the use of low-cost protein-rich foods, food losses through spoilage, the teaching of food technology and the status of research in Latin America, present conditions prevailing in the various food industries, and planning for future development.

A major objective of the seminar was the working-out of a general guide for the introduction of up-to-date techniques in Latin America's food industries.

In addition participants gave brief summaries of the food technology situation in their respective countries.

F.A.O.'s staff was headed by Dr. Z. I. Kertesz, Chief of the F.A.O.'s Food Science and Technology Branch.

SOME LIKE IT HOT

To counter the prejudice against eating cold food in the winter, a German manufacturer has developed a special package which, besides vanilla ice cream contains frozen fruit purée which is being added in a special plastic bag. This fruit purée is heated in the oven and poured *hot* over the ice cream.

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Non-Enzymatic Browning

Development of Chromophores in the Glucose-Glycine and Sucrose-Glycine Systems

The development of chromophores in the glucose-glycine and sucrose-glycine systems was examined. During the reaction a number of conjugated unsaturated carbonyl compounds develop, the quality present at any one time being greater as the reaction proceeds, until browning is well advanced. During this period, which follows the period of rapid pH fall and α -amino N utilization, the fluorescence of the system increases, and the quantity of water-soluble, non-volatile compounds extractable into various organic solvents increases. The presence of sulphites slowed the rate of development of conjugated unsaturated carbonylic and fluorescent compounds, and of subsequent early browning, whereas in the presence of sodium pyrophosphate, their rates of production are increased.

It is suggested that the production of larger carbonylic N-containing polymers from smaller carbonyl compounds, occurs in the sugar-amino compound systems.

H. S. Burton, D. J. McWeeny and D. O. Biltcliffe, "J. Food Science", 28, 631, 1963.

The Role of Unsaturated Carbonyl Compounds as Intermediates and of Sulphur Dioxide as an Inhibitor of Browning

Most rapid browning with a reactive nitrogen function occurs with straight chain α -unsaturated aldehydes. When the conjugated unsaturation is within a ring structure, as in the furfurals, chromophore development is slower. When

the unsaturated centre is substituted, the browning rate is much reduced.

The retardation in the browning of carbonyl/amino systems caused by sulphites is due to combination of the sulphite both with the carbonyl group and with unsaturated centres. Inactivation of sulphites as browning reaction inhibitors occurs through combination at sites of unsaturation to form sulphonates, which do not readily yield SO_2 on acid hydrolysis by the Monier-Williams technique. This explains the loss of sulphites observed on storage of foodstuffs, and the observations that sulphite loss is not matched by concomitant equivalent sulphate development or loss of volatile sulphur, or by the formation of free sulphur.

H. S. Burton, D. J. McWeeny and D. O. Biltcliffe, "J. Science of Food & Agriculture", 14, 911, 1963.

IMPROVED PROCESS FOR CANNED BAKED APPLES

The main problem in canning whole apples is to remove most of the gas from the fruit tissue. Excessive amounts of residual oxygen cause rapid corrosion in the can headspace. The Summerland Food Processing Laboratory of the Canada Department of Agriculture has developed a method of removing gas by vacuum.

Cored and peeled apples are loaded into stainless steel baskets in a 12 inch deep layer, and held in a chamber under 28 inch vacuum for 10 minutes. The vacuum is broken with 190°F water, and fruit allowed to blanch until sinking indicates that water has replaced gas in the tissue.

FOOD RESEARCH IN BRITAIN

Further modifications to the general food research set-up in Britain have recently been announced.

Professor S. R. Elsdon, professor of microbiology at Sheffield University, has been appointed director of the Food Research Institute, which is planned to open at Norwich in 1966 in association with the new University of East Anglia.

The basis on which the F.R.I. will operate is as follows: the meat research staff and programme of the Low Temperature Research Station at Cambridge will be transferred to the new Meat Research Institute, to be opened in 1966 near Bristol. The remaining staff will be merged with most of those from the Ditton Laboratory, which is concerned entirely with fruit and vegetables. In addition to these the F.R.I.'s programme will cover poultry meat, eggs, oxidative rancidity of fats and fundamental work on the chemical components of food and the chemistry of flavour.

This work, like that of the Meat Research Institute, will be mostly of a fundamental biochemical nature and concerned with the problems of the properties, behaviour and distribution of the fresh foods. The work of the M.R.I. will be concerned with carcass meat but not manufactured meat with the exception of cured bacon.

The work of the M.R.I. will be helped by the establishment of an advisory committee on meat research which will work closely with the Institute.

The British Food Manufacturing Industries Research Association at Leatherhead will continue to be recognized as the organization responsible for research in the fields of the manufacture and processing of foods other than those catered for by the R.A.'s concerned with flour milling, baking, and fruit and vegetable canning and quick freezing.

ICE CREAM RESEARCH

Resulting from an approach from the Ice Cream Federation the Agricultural Research Council is to review, in conjunction with the National Institute for Research in Dairying and the Hannah Dairy Research Institute, work done on the chemical and bacteriological analysis of ice cream products and also on flavour deterioration of the component parts of milk. It will also consider the subject of factors affecting shrinking and dehydration for the programme at the Food Research Institute. The general question of measurement of flavours is already included in the F.R.I.'s programme.

Common sense is genius dressed in its working clothes.

— Ralph Waldo Emerson

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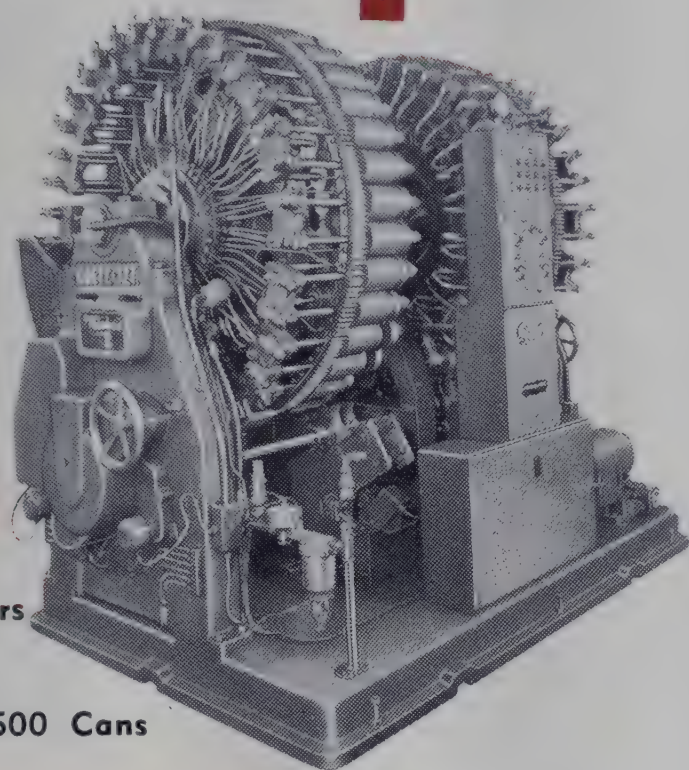
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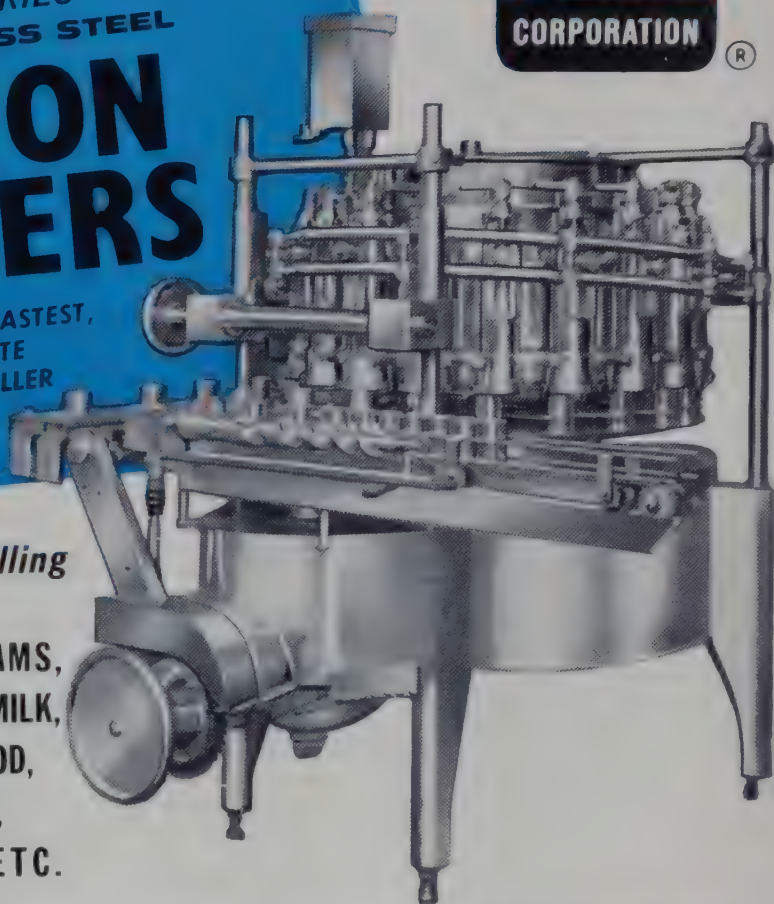
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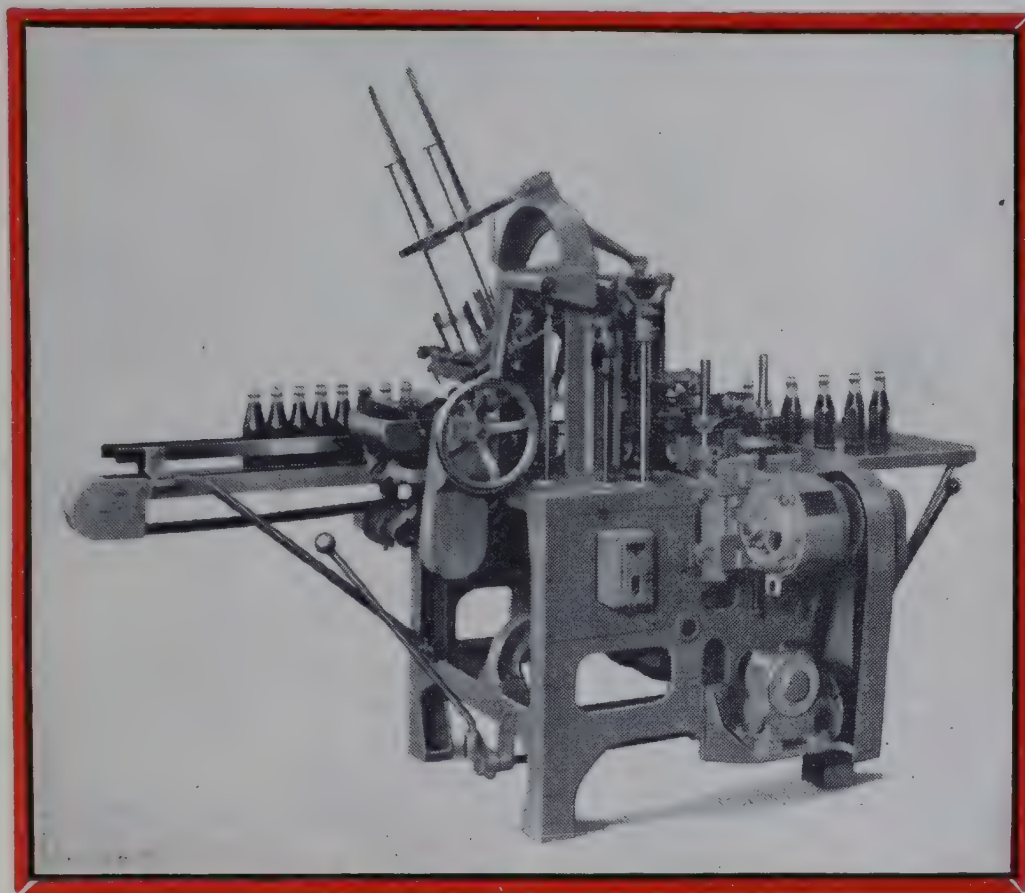
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12 O'Connell Street, Sydney.

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Editor:

F. H. REUTER, Ph.D., F.R.I.C., F.R.A.C.I.
Associate Professor of Food Technology.
The University of New South Wales.

Business Manager:
S. M. ADAMS.

Office:
12 O'Connell Street, Sydney, N.S.W.
Telephone: 25 5401.
All correspondence to be forwarded to this
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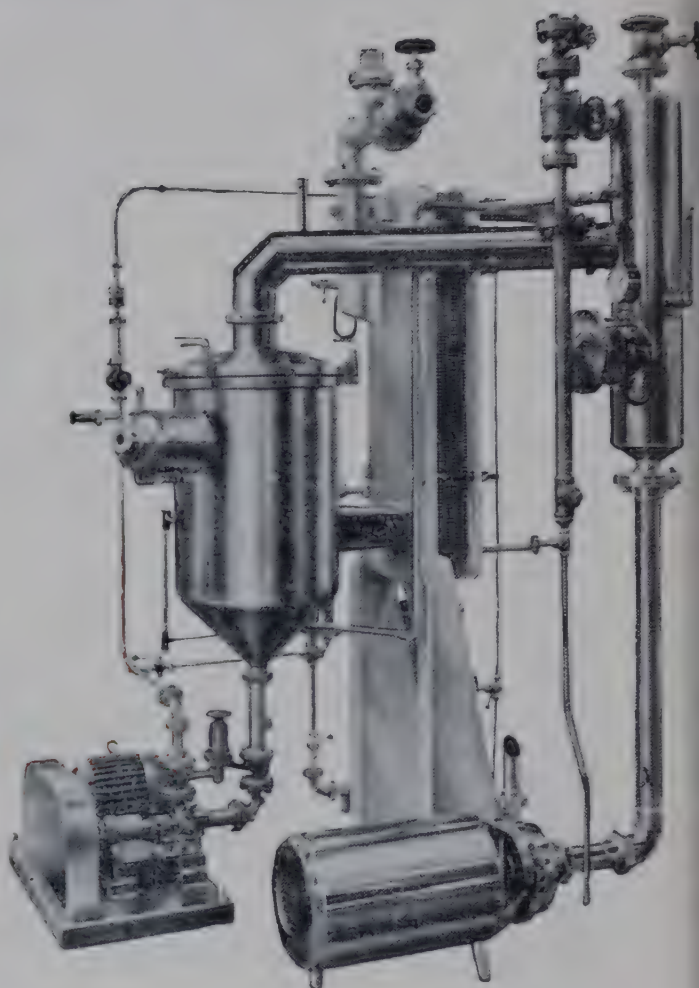
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The Steak at Stake

The belief is widely held that modern foods lack something in comparison with old fashioned foods, that traditional foods are somehow endowed with qualities which sophistication has spirited away from modern foods.

We all cherish our tribal beliefs and hate to see them destroyed, be it in the spiritual, social or culinary sphere.

What could be more traditional — and therefore *good* — than meat cooked over an open wood fire. Cavemen must have done that.

Yet recent investigations have put this under a cloud of suspicion. These are the observations: Chicago research workers grilled a number of two pound steaks over a charcoal fire. The steaks were then subjected to chemical analysis and showed the presence of very significant quantities of a chemical well known by its ability to produce tumorous growths in animals. The particular compound is 3,4-Benzpyrene and the concentration found 8 parts per million (8 mg/kg).

This substance belongs to a group of chemicals known as polynuclear hydrocarbons. It is well known to be formed by the action of high temperature on organic substances of very different chemical make-ups.

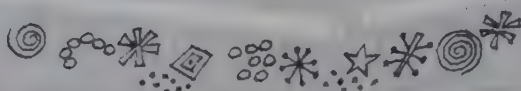
The mechanism of the chemical reaction probably is the same as that which converts black coal into gas, tar and coke in the heat of the coke oven. This coal tar also contains significant amounts of polynuclear hydrocarbons, including 3,4-Benzpyrene. By the same kind of heating — high temperature process in the absence of air (pyrolysis) — the charcoal burner of old produced wood tar as a by-product.

It is now fifty years since two Japanese workers demonstrated that the application of coal tar to the skin produced malignant growths in animals. This was experimental evidence in line with earlier observations that chimney sweeps and industrial workers exposed to bodily contact with coal tar products tended to show an abnormally high incidence of skin cancers. Later on this matter became the object of a very intense research effort to identify the cancer causing agent in coal tar. The work was initially centred at the Royal Cancer Hospital in London where in 1933 J. W. Cook and his co-workers noted that coal tar contains 1.5 per cent of 3,4-benzpyrene. They isolated it and demonstrated that it was carcinogenic, *i.e.* capable of producing cancers. In the meantime more than a thousand other chemicals have been similarly incriminated, some of them chemically similar to benzpyrene, others not at all. These include a number of dyestuffs and the chemicals employed in their production. However, the great hope that work on these lines would point to the cause of cancer and lead to its prevention has not been fulfilled.

The evaluation of substances for their carcinogenic activity is a very complex matter, like all toxicological work. The conditions of application to the animal have a profound effect on their biological action, whether the substance is taken in with the food, inhaled, injected or applied to the skin. It often even depends on the animal species employed for the test whether a substance will produce tumours or fail to do so.

This then means that in this kind of testing only the positive result is

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conclusive. Negative test results may mean that testing under different conditions or using another animal species might still show a substance to produce tumours. Just as well, or we would not be able to eat glucose or hard boiled eggs, both of which gave positive reactions when injected into animals under certain experimental conditions. Finally, there remains the problem of evaluating the results of animal experimentation in terms of human experience and margins of safety.

It is against this background of experimentation on the cause of cancer that we must look at the Chicago steak story.

It can be assumed that the benzpyrene found on the grilled steaks was formed from the fat which dropped on the glowing charcoal. Some of it surely burned completely to carbon dioxide and water and was not seen again. Some was chemically affected in a different manner and became part of the smelly smoke that goes with the heating of fatty meats on an open fire. Just as coal tar deposits in chimneys from this smoke from a coal fire, so tar deposits on the comparatively cool steak which, after all, never gets much hotter than boiling water, even on the outside. It is this deposit of flavouring substance combined with a thin layer of overheated meat and its juices make up the famous flavour of charcoal broiled steak.

The Chicago experiment must of course be seen in its proper perspective and the 8 ppm of the carcinogen were found on steaks grilled under their particular experimental conditions, *i.e.* with a 6 inch spacing between steak and charcoal fire. Assuming that pyrolysis of fat be the cause, any variation of the conditions would produce different results, *e.g.* better removal of smoke.

It is rather ironical that a most traditional method of food processing — the grilling of meat — should now come under suspicion, when it is additives, intentional and incidental, which are under constant

attack. Thinking of benzpyrene and cancer, let us not forget cigarettes: benzpyrene has also been isolated from cigarette smoke. But it took 1000 cigarettes to produce as much of it — in the smoking machine — as had been found on the experimental two pound charcoal broiled steak in Chicago.

KESTNERS' NEW FACTORY

Early in March, the newly erected Head Office and Factory of Kestners (Australia) Pty. Ltd. at Brookvale, N.S.W., was officially declared open by Mr. Brian Reavell, Chairman of Kestner Evaporator & Engineering Co. Ltd., London.

The new factory and office block, occupying 7,000 sq. ft., is equipped with full production and testing facilities, including a range of modern machine tools, for the manufacture of all Kestner items of chemical plant and process equipment — including corrosion resistant pumps, mixers, evaporators, drying plants, metal pickling and acid handling plant, laboratory and pilot plant, etc.

Approximately 100 visitors attended the official opening, representing all major Australian organizations associated with the chemical and allied industries. The N.S.W. State Government was represented by the local Parliamentary member, Mr. R. O. Healey.

The Australian company was established in Sydney in 1952. In 1958, a branch office was opened in Melbourne.

1965 AUSTRALIAN CANNING CONVENTION

The 1965 Australian Canning Convention will be held at Wrest Point Riviera Hotel, Hobart, from Monday, 13th September to Friday, 17th September.



MICROBIAL ADAPTION AND SELECTION IN FRUIT JUICES

By P. E. SEALE,

The Golden Circle Cannery, Brisbane.

The objectives of the fruit juice processor are considered and the environmental influences on microbial growth discussed in relation to commercial operations — likely flora, contamination sources, and typical levels of infection.

The selective, inhibitive or promoting effects of pH sugars, temperature, preservatives, carbon dioxide and other gases, both individually and cumulatively, are reviewed from the point of view that the presence of micro-organisms is undesirable in fruit juices and their growth should be stopped or inhibited as rapidly as possible.

The principal objective of the Fruit Juice Technologist is to present a product for sale in a sound condition; normally, with as little variation as possible from the freshly extracted state. With the exception of enzymic action, microbial growth is generally more rapid than the usual biochemical and chemical changes, and is therefore the first problem for resolution before considering these other factors. An understanding of the individual or cumulative effect of environmental conditions on microbial populations is necessary to achieve the objective of hindering their growth.

There are three different groups of micro-organisms responsible for spoilage. Moulds which are mainly visible as a surface film, yeasts which ferment the juice to produce alcohol and carbon dioxide, and bacteria which produce acid and sometimes gas as a by-product of their metabolism.

CONTAMINATION LEVELS

The level of contamination has a profound influence on the ultimate processing operations. This level will be affected by the condition of the incoming fruit which, even in apparently sound condition, can be expected to produce an infection magnitude of 10^2 to 10^3 organisms per millilitre (ml) in the expressed juice. Under commercial conditions these levels are likely to increase to up to 10^5 organisms per millilitre and at this level flavour changes will be on the threshold of detection. This rise may be due to the inclusion of sub-standard fruit, inadequate washing techniques, and a considerable build-up in infection from handling equipment, even in plants practising good sanitation programmes.

The organisms of spoilage significance are not necessarily present on

An address to the 13th Convention of the Institute of Food Technologists, Australian Regional Sections, Mildura, Vic., 1963.

the fruit in dominant quantities; however there is ample evidence of the presence of varieties known to be responsible for spoilage. Different areas of the surface of the fruit will also have varying flora, e.g. osmophilic yeasts occur on the part of the fruit where the nectaries of the flower were located.

Proper selection and operation of fruit washing and handling equipment together with the use of sterilizing agents such as chlorine can materially reduce counts. Frequency and extent of clean-up practices vary with variety, climatic conditions, and laboratory findings.

Choosing a preservation method has already been stated as a prime objective, so it will be appropriate to discuss selective and lethal environmental conditions in relation to this aim.

pH

Of all the significant factors applicable to the fruit juice industry pH is probably the most important. The hydrogen ion has a very potent effect on micro-organisms, particularly bacteria, and the normal pH range of fruit juices 2.8 to 4.5 provides the highest concentration of hydrogen ions as far as foodstuffs are concerned. Yeasts, moulds, and certain acid tolerant bacteria such as the leuconostoc and the lactobacilli, will tolerate and even thrive under these conditions, but growth of the putrefactive and pathogenic bacteria is effectively inhibited, though the safety margin may be small with the dangerous *Clostridium* species.

The effect of pH on *E. coli*, which although relatively unimportant as a spoilage organism, has significance from a public health aspect as a possible indication of contamination, has been studied with the following results:—

Inoculations of 100 organisms per ml in a 10° Brix lactose broth culture were reduced to conformity with drinking water standards in 110 hours at pH 4.0, 16.7 hours at pH 3.0, and 1.36 hours at pH 2.0.

At pH 4.5 growth continued. Similar studies on apple juice at pH 4.12 have confirmed these results and demonstrated that the death rate was logarithmic with time.

The pH of fruit juices is conditioned by the concentrations of mixtures of organic acids varying from 0.2 to around 8 per cent. These acids exert germicidal influences which, judged by the amount of acid present, were rated by Erickson & Fabian (1942) as lactic>acetic>citric for bacteria, and acetic>lactic>citric for yeasts. As the acidity is increased in a juice, and pH reduced, there is a distinct inhibitory effect on the growth of yeasts as well as bacteria, so that total counts at the point of extraction may vary with seasonal changes in acidity. Moulds and some yeasts are capable of attacking the main fruit acids, thereby creating conditions suitable for bacterial multiplication.

SUGAR CONCENTRATION

The trend towards concentrated fruit juices and the existing market for cordials and syrups makes a consideration of the effect of sugar concentration pertinent.

Low levels of sugar provide an ideal environment for yeasts and moulds, provided other essential food requirements are met. These conditions are fully provided in the case of fruit juices. If the sugar content is increased to 50° Brix, virtually all bacteria and most moulds and yeasts are incapable of growth. However, certain osmophilic or sugar tolerant yeasts and moulds will grow at up to 80° Brix. The limiting concentration for growth is co-related with pH so that while a syrup at 75° Brix and pH 4.3 may ferment, there will be no fermentation in an orange concentrate at 72° Brix and pH 3.0 to 3.5, and rare occurrences in lemon concentrate at 60° Brix and pH 2.5. As sugar concentration is increased the rate of multiplication decreases to the extent that it may take several days for the population to double in the osmophilic range.

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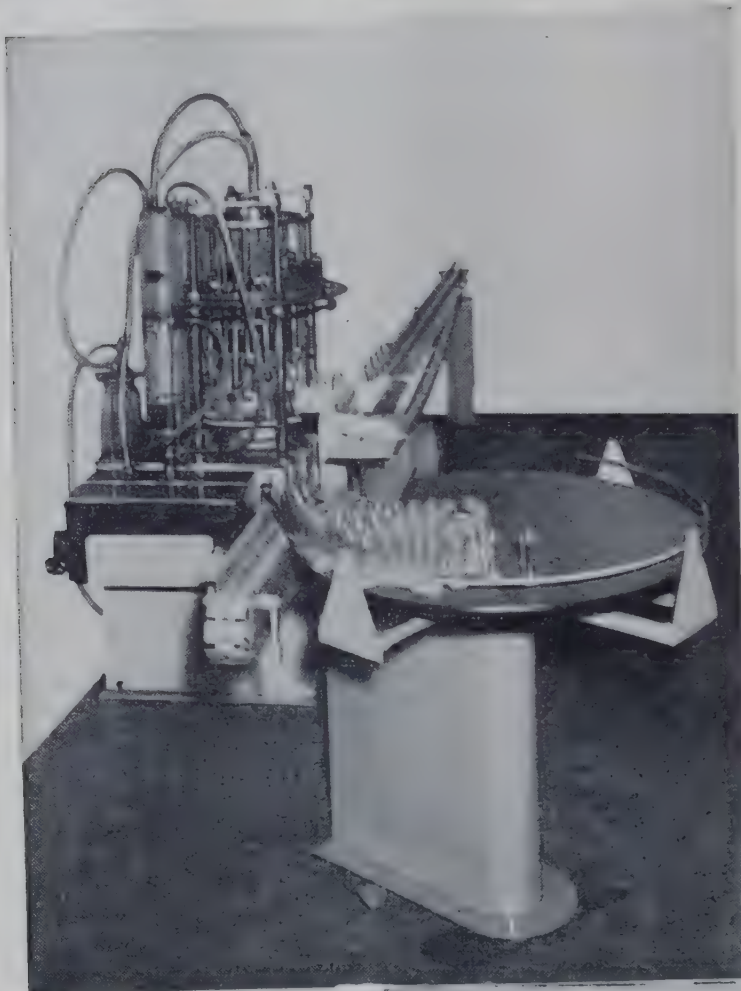
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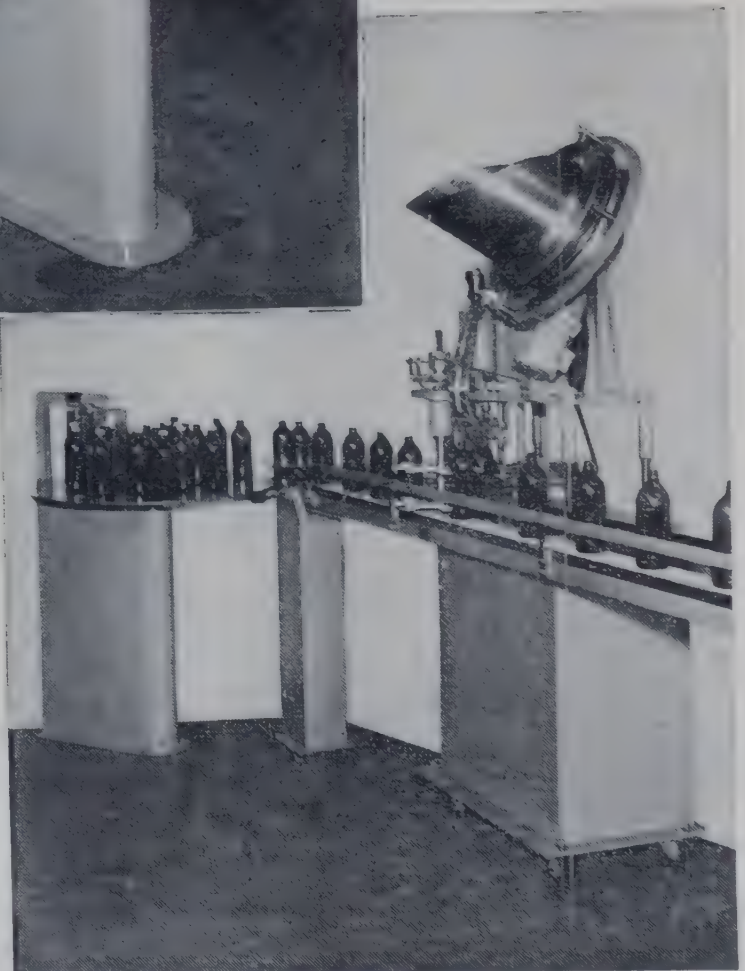
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TEMPERATURE

For any given set of conditions and species, an optimal temperature exists for most rapid growth. Below and above this temperature the rates will be reduced, falling slowly at the lower temperatures and precipitously at the higher ones.

On the basis of their reaction to temperature, microbes may be divided into three broad groups each with a temperature range in which it grows best (*optimal range*) and one in which growth will just occur (*minimal range*).

		optimal range °C	minimal range °C
thermophiles ..		45-60	20-40
mesophiles		35-45	5-10
psychrophiles ..		15-25	less than 0

initial population of 10,000 organisms per ml to 1 billion per ml in 24 hours, while the osmophilic yeast raised the count to 50 million in 2 days. Growth rates of the three organisms were progressively inhibited with decrease in temperature and increase in Brix. The minimum temperature and maximum Brix were interrelated, that is bacterial growth occurred in 30° Brix at 60°F but not 50°F, and the yeast grew in 58° Brix at 60°F but not 50°F. Both bacterial strains died in 42° Brix and above, regardless of temperature, and both died at 40°F regardless of Brix. At 40°F the yeast grew slowly in all concentrations through 42° Brix.

TABLE 1
Effect of Temperature and Soluble solids concentration on generation times (in hours)

ORGANISM															
Leuconostoc Sp.						Lactobacillus Plantarum Var. Mobilis					Zygosaccharomyces Vini				
Concentration of Soluble Solids in media (Orange concentrate diluted as required)															
Temp. °F	Degree Brix					Degree Brix					Degree Brix				
	12	20	30	42	58	12	20	30	42	58	12	20	30	42	58
86	1.3	1.3	2.3	—	—	1.6	2.0	3.3	—	—	2.7	2.6	3.2	4.0	9.2
60	3.8	4.5	7.8			10.6	12.0	26.6			7.4	7.5	8.8	13.0	31.2
50	9.6	14.9	—			55.0	60.0	—			18.6	21.5	22.0	39.5	—
40	—	—				—	—				103.0	89.0	84.0	96.0	

(— No Growth)
Ref:— Berry, J. M., Witter, L. J., and Folinazzo, J. F. (1956).

It is clear then that the prevailing temperature will exert a selective influence and will control the type of organism that can multiply.

The influence of pH has already limited us to considering certain groups of micro-organisms, so that the effect of ambient and reduced temperatures on typical examples of these groups is pertinent. Generation times for a leuconostoc, a lactobacilli and an osmophilic yeast, under different temperatures and degrees of concentration of orange iuice, have been studied by Berry, Witter and Folinazzo (1956). (See Table 1.)

They noted that optimum test conditions for the growth of all three organisms were 12° to 20° Brix and 86°F. Under these conditions, the leuconostoc and lactobacillus had a generation time of approximately 1.5 hours raising an

As the temperature is reduced further, freezing occurs and ice forms until sufficient water has been withdrawn from solution to bring the composition of the remaining liquid to that of a eutectic. There is therefore a range of intermediate temperatures between 32° and 0°F, which will provide a mixture of solid ice and fluid aqueous phase, dehydrated in proportion to the temperature level. It seems likely that micro-organisms are able to survive at low temperatures owing to the presence of this unfrozen phase, and because high concentrations of sugar tend to decrease the mortality rate at low temperatures.

In frozen juice, no multiplication of micro-organisms takes place: on the contrary they die, at rates depending on the kind of organism and the environment. Moulds and

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yeasts are more tolerant than vegetative bacteria and the spores of the latter are unaffected. In the range of 32° to 0°F death rate is higher at the higher temperatures; it is increased by lowering the pH, and decreased by increasing concentrations of sugar.

The effects of storage temperature, pH level and sucrose concentration on the growth of *Sacch. cerevisiae*, are summarized in Table 2.

TABLE 2
The effect of Acidity on the mortality of *Saccharomyces cerevisiae* cells held in solutions of sucrose in distilled water at pH 3.7 and 5.0.

Sucrose (%)	WEEKS FOR 99% KILL			
	TEMPERATURE			
	-10C°		-20° C	
	pH			
	5.0	3.7	5.0	3.7
0	8	15	>28	—
5	>28	2	>>28	15
10	>28	3	>>28	6
15	28	6	>28	15
20	20	15	>28	20
50	>>28	17	>>28	—

McFarlane (1940)

Using sweetened juice media and a storage temperature of 0°F, the reduction in population with time has been studied by McFarlane (1942) at pH 3.6 (Table 3) and pH 3.0 (Table 4).

Greater microbial destruction occurred in the unsweetened juice

than in the sweetened medium, confirming the protective action of the higher concentrations of sugar.

The application of heat is the principal industrial method for the preservation of juices. The so-called flash pasteurization involves heating rapidly to 185-195°F and holding for a period of a few seconds. This suffices to destroy the yeasts and bacteria likely to cause spoilage: the more resistant moulds are likely to survive, but are normally inhibited by the low oxygen availability in canned or bottled products. A variety of organisms have been isolated and identified from canned orange juice (*Bacillus mesentericus*, *subtilis* and *vulgatus*, *Mucor* species, *Penicillium glaucus*, *Lactobacillus*, *Thermophilus*, a *Sarcina* species, etc.). Their inability to grow in a canned product rendered them unable to cause biological spoilage and a product of this type would be considered commercially sterile.

The environmental conditions will also have an influence on the thermal death rate. The presence of sugar particularly in higher concentrations, has a considerable inhibiting influence, while the presence of preservatives may tend to accelerate pasteurization. Pederson and Beavers state that 22 ppm of sulphur dioxide may lower the pasteurization temperature as much as 10°F.

Tomato juice which has a normal pH in the vicinity of 4.2, has been

TABLE 3

The effect of storage at 0°F and pH 3.6 on a *Torula* species and *E. Coli* in sweetened and unsweetened Orange Juice.

Organism	Sol. Solids in Orange Juice	Storage Time in Weeks				
		0	1	4	8	26
		Count				
<i>E. Coli</i>	Juice,	8,400,000	3	(?) +	—	—
	Juice, 20° Brix	5,800,000	220,000	1,500	13	—
	Juice, 30° Brix	5,600,000	1 157,000	893,000	130,000	(?) +
	Juice, 50° Brix	4,000,000	3,340,000	1,683,000	505,000	9,320
<i>Torula</i> Species		0	1	8	24	72
	Juice,	805,000	753,000	590,000	198,500	202
	Juice, 20° Brix	720,000	737,000	640,000	371,500	1,489
	Juice, 30° Brix	740,000	673,000	693,000	616,500	8,667
	Juice, 50° Brix	660,000	637,000	745,000	661,500	356,000

McFarlane (1942)

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subject to flat sour spoilage by *Bacillus thermo-acidurans* which occurs as a soil infection. White (1951) reports no growth at pH 4.12, and growth at pH 4.32 after processing 6 minutes at 210°F.

Andersen, Esselen and Fellers (1949) quote 99.99 per cent destruction of 100,000 spores per ml inoculations in 22 minutes at 212°F at pH 4.4, which was reduced to 12 minutes in acidified juice at pH 4.0. Nevertheless, commercial operations use hot fills at 190°F with short holding times or processes in the vicinity of 15 minutes at 212°, and presumably rely on good washing practices and suitable pH levels to control spoilage.

EFFECT OF GASES

The presence or absence of oxygen will be selective in limiting the flora available for multiplication. Yeasts, moulds, and the common spoilage bacteria will multiply vigorously in the presence of air. Under anaerobic conditions yeasts will tend to enter the fermentative stage and reproduction will cease, while bacteria especially the lactobacilli, will grow vigorously. This is a particular hazard in the type of vacuum concentration equipment utilizing multiple effects and low temperatures for citrus and pineapple juices. The duration of product runs in these instances is governed by microbial build-ups which are influenced by initial loads, types of organism present and the pre-

treatment provided. Some of the newer approaches to concentration, utilizing higher operating temperatures and shorter contact time, virtually eliminate this hazard; and such plant can be operated continuously for periods up to five days.

Moulds are generally inhibited by lack of oxygen though growth has been reported down to 14 in. vacuum. We had an interesting example of this type of spoilage problem in bottled pineapple juice packed under vacua of this magnitude. The bottles exhibited irregular clarification after 2-3 months storage, in from one to a dozen bottles per two dozen case. Pasteurization at 185°F had been followed by hot filling with a two-minute hold at 175°F. The loss of cloud in the beverage was due to a minute mould growth which apparently generated sufficient enzyme activity to attack the pectin content of the juice, reducing viscosity and upsetting the colloidal balance, and causing agglomeration and settling. The mould was believed to have been present in the composition cork seal and not sufficiently accessible for inactivation by the heating process. Covering the cork surface with an impervious vinyl film prevented contact between the juice and the cork and eliminated the problem of mould infection.

Carbon dioxide exerts an important influence on fruit juice storage and bottling processes. The *Boehi* process which is widely used for

TABLE 4

The effect of storage at 0°F and pH 3.0 on a *Torula* species, *Saccharomyces cerevisiae* and *Saccharomyces ellipsoideus* in Loganberry juice and in acidified Loganberry juice — sucrose solutions

Organism	Sol. Solids in Medium	Storage Time (Weeks)			
		1	4	12	30
		Count			
Torula Species	Juice,	1,065	129	19	0
	Juice, 20° Brix	2,985	977	427	46
	Juice, 30° Brix	2,300	1,084	613	154
	Juice, 50° Brix	2,915	2,254	1,103	602
Saccharomyces cerevisiae	Juice,	5,567	690	16	0
	Juice, 20° Brix	7,300	2,275	487	10
	Juice, 30° Brix	6,767	3,110	1,000	156
	Juice, 50° Brix	10,600	2,433	1,567	360
Saccharomyces ellipsoideus	Juice,	133	1	—	—
	Juice 20° Brix	865	64	(?)1	—
	Juice, 30° Brix	1,100	285	22	—
	Juice, 50° Brix	2,100	598	78	—

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apple juice storage in Europe and more recently in North America, relies upon high levels of carbon dioxide (3.5 volumes) and cool storage below 35°F. The reduced temperature is necessary to inhibit lactobacilli which require up to 8 volumes of carbon dioxide for inhibition at 59°F. The juice may be stored for many months, providing a method of delivering *fresh* juice virtually all the year round, *i.e.* a product preserved without heat.

The soft drink industry would be the major example of the utilization of the inhibitory effect of carbon dioxide. Witter, Berry and Folinazzo (1958) demonstrated that, provided the pH was less than 4.0 and carbonation more than 2 volumes, no growth would occur from inoculations of *E. coli* or a spoilage yeast culture. In fact 100 *E. coli* per ml were reduced to zero in 10 days at 3 volumes and pH 4.0, while 100 yeast cells required over 100 days under the same conditions. Aiola (1960) in a paper to the Society of Soft Drink Technologists, reported that he had not been able to locate an instance of a pathogenic organism being isolated from a carbonated beverage except in laboratory experiments.

These statements may be accepted as true for the test organisms and probably give a fairly accurate picture of the general situation; however, bottles have been known to burst from the excessive carbon dioxide pressure from a fermenting beverage. Also, the very low mortality rate for the yeast suggests that metabolism would be continuing for sufficient time to render the product objectionable.

The lethal effect has been demonstrated to be due to the chemical influence of carbon dioxide rather than the effect of pressure, as 60,000 to 80,000 lb per sq. in. pressure for periods up to 30 minutes are required to achieve sterility through pressure alone.

CHEMICAL PRESERVATIVES

Food regulations in Australia permit the use of three preservatives

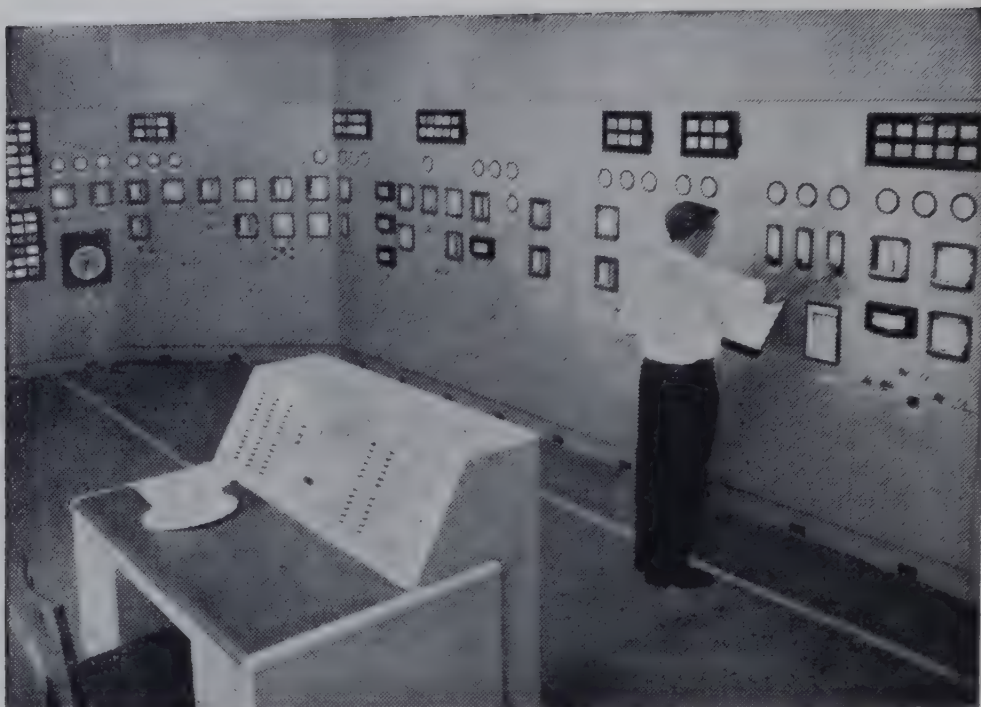
— sulphur dioxide, benzoic acid and sorbic acid. The activity of any preservative is primarily dependent on concentration. If present in a certain concentration or higher the effect on micro-organisms is lethal. In lower concentrations inhibition of growth but not death occurs, while still lower concentrations may stimulate growth. Food regulations, in general, permit addition at the inhibitory level.

Sulphur dioxide is more active against bacteria and moulds than against yeasts, and is more effective in juices than in concentrates or syrup. This is due to combination of sulphur dioxide with carbonyl groups in glucose and other sugars, aldehydes which may be the by-product of fermentation, and aldehydes like furfural which may be the result of the browning reaction. This proportion of combined sulphur dioxide then is likely to be at comparatively high levels in concentrates, in juices that have darkened or been pasteurized, or where fermentation may have occurred. This situation also explains the difficulty experienced in trying to stop a fermentation by the addition of extra quantities of sulphur dioxide.

The remaining *free* sulphur dioxide is the active portion and is only effective in the undissociated state, so that its anti-microbial action is dependent on pH. Some varieties of yeast are known to have high sulphur dioxide resistance and this resistance can be cultivated through exposure to it. We have had experience of active fermentation in apple juice at 700-800 ppm sulphur dioxide at pH 3.5 and over. Acidification below pH 3.5 effectively inhibited further growth at this concentration of sulphur dioxide.

BENZOIC ACID

Benzoic acid is sparingly soluble in water and is therefore generally incorporated into juices or beverages as a solution of the soluble sodium salt. In the latter form permissible levels are 0.05 per cent in car-



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bonated beverages, and 0.1 per cent in cordials, syrups, etc.

These levels are adequate in their respective fields, provided initial contamination levels are kept under control. Benzoic acid is most effective against yeasts and moulds and least effective against bacteria, requiring up to 0.3 per cent to control some types. As with sulphur dioxide, it is the non-ionised acid which is effective as a preservative, so that efficiency increases as the pH is lowered. Benzoic acid is 100 per cent effective at pH 2.0, 95 per cent at pH 3.0, decreasing rapidly to 60 per cent efficiency at pH 4.0.

SORBIC ACID

Sorbic acid closely follows benzoic acid in its general characteristics and is selected for some applications because of its better threshold taste characteristics. Emard and Vaughn (1952) have studied the mechanism by which microbial growth is suppressed, and have concluded that sorbic acid selectively suppresses catalase-positive micro-organisms by blocking the functioning of certain sulphhydryl enzymes. This would account for its specificity for yeasts, moulds and most bacteria, and its ineffectiveness against the catalase-negative lactobacilli and clostridia.

Addition of sorbic acid is normally permitted at the same levels as benzoic acid, however it is recognized as being slightly less effective. Its dissociation characteristics (98 per cent undissociated at pH 3.0 and 86 per cent at pH 4.0) suggest advantages over benzoic acid in the pH range between 3.5 and 4.5.

PYROCARBONIC ACID DI-ETHYL ESTER

This is an interesting new preservative, which is reported to develop naturally during the manufacture of champagne, and has recently been investigated and synthesized by the Bayer Company. It is effective at concentrations 0.05 to 0.1 per cent against a wide variety of yeasts and bacteria, provided initial con-

tamination is at a reasonable level (generally less than 1000 organisms per ml). Reports on activity against moulds are varied, some suggesting that the above levels are adequate, others claiming inhibition only at around 0.5 per cent.

This compound commences to hydrolyze immediately on mixing with water, breaking down to alcohol and carbon dioxide. At 68°F only 54 per cent of the compound remains after one hour and hydrolysis is complete in less than eight hours. The reaction is slowed down by lowering the temperature, requiring 24 hours at 32°F, and is accelerated with a rise in temperature so that it reaches completion in 3 hours at 104°F. Obviously, the method of addition requires both careful control and minimum delay before application and exclusion from subsequent contamination.

The manufacturers stress that at least 24 hours should elapse between the manufacture of a beverage and consumption. We have confirmed the lethal action of this preservative at both 0.1 and 0.05 per cent levels, using a culture of wild yeasts from an active fermentation in an apple juice. Sterility was achieved in both concentrations at up to 5000 organisms per ml. Experiments in a carbonated Lemonade also achieved reasonable sterility, but showed some flavour effects that were not expected considering the proposed hydrolytic breakdown reaction.

Nevertheless, this type of preservative, provided it receives public health approval, could open interesting possibilities to the juice technologist.

Summarizing these individual inhibiting factors and their cumulative influences, we find that the following practical applications are made:—

1. *Pasteurized Juices:* Below pH 4.2, heating to 185-195°F for a few seconds destroys the yeasts and bacteria capable of developing at these pH levels, though more severe con-

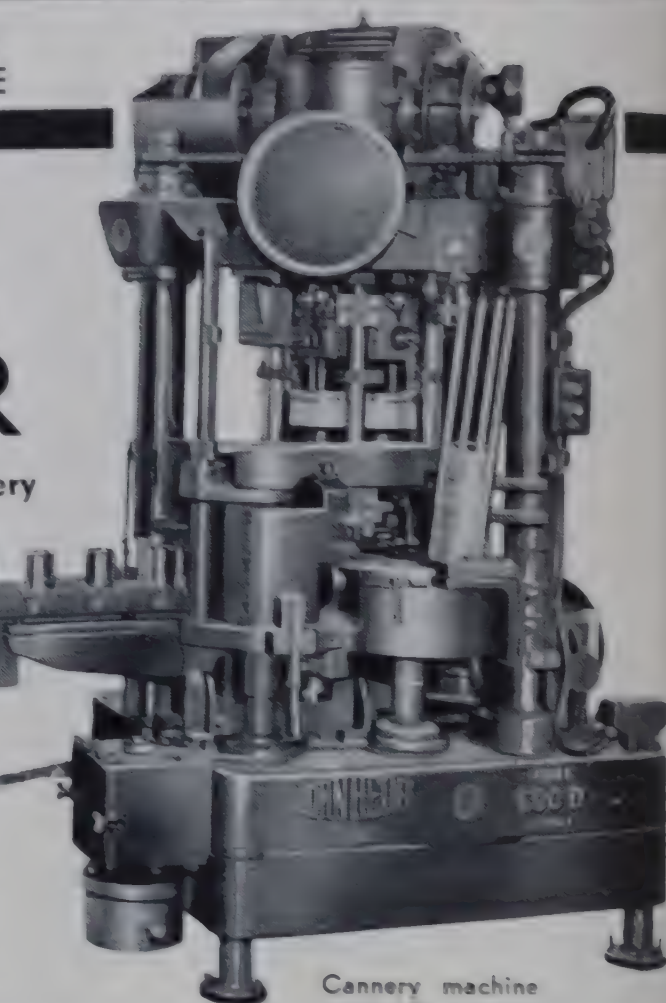
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ditions may be necessary to inactivate enzyme systems. Canning or bottling provides reduced oxygen tension which prevents mould growth.

2. *Freezing*: Complete freezing to below 0°F will, in sufficient time, kill vegetative organisms but let spores survive. High sugar concentrations protect organisms but retard multiplication.

3. *Chemical Preservation*: Effectiveness of preservatives depends on kind and concentration of the preservative and pH. Each preservative has its weak points, they are therefore frequently combined and used in conjunction with low temperature, carbonation, or high sugar levels.

4. *Carbonation*: Carbonation is effective at high levels provided pH is below 4.0, and at lower levels if combined with reduced temperature or preservative addition.

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F.T.A. of W.A.

CHRISTMAS SOCIAL MEETING, 1964

Over 100 members and their ladies attended the Association's Christmas Social Meeting which was held at the Nedlands Yacht Club on Monday, 7th December, 1964. The function took the form of a Buffet Dinner-Dance interspersed with a lecture on the subject "*The Technology of Drollery*", and light entertainment.

WEIGHTS AND MEASURES

At a General Meeting held on Wednesday, 17th February, 1965, opportunity was taken to discuss the Proposed Code for the Marking and Standardization of Packaged Goods. The discussion was led by Mr. R. R. (Bob) Heales (author of the "*Heales Report*"). Mr. Heales opened the discussion by tracing the history of events leading up to the issue of the Proposed Code.

FUNDAMENTALS OF FOOD PROCESSING, 1965

Arrangements for the "*Fundamentals of Food Processing, 1965*" educational course are nearing finality. The course which has been arranged in conjunction with the newly established West Australian Institute of Technology, will be held at Bentley (a Perth suburb) each Wednesday afternoon, commencing on June 2, at 3 p.m. Lectures, numbering 18 in all, will be of one hour's duration. Members of this Association will co-operate with the Institute of Technology in providing suitable lecturers.

FOOD AND DRUGS ADVISORY COMMITTEE

Mr. John R. Edinger, Immediate Past-President of this Association and Works Manager of F. H. Faulding & Co. Ltd. has been nominated as a member of the Western Australian Food and Drugs Advisory Committee.

AMENDMENTS TO PURE FOOD REGULATIONS - WESTERN AUSTRALIA

GAZETTED 2nd JUNE, 1964

Preservatives (Reg. A. 02)

Clause A. 02. 002. This has been amended to permit benzoic acid to be replaced, where permitted, wholly or in part by sorbic acid or sorbates.

Flavourings and Colourings (Reg. A. 04)

The regulation has been amended to correspond to that recommended by the N.H. & M.R.C. The amendments include the following changes:—

Synthetic reproductions of vegetable colourings now classed as permitted colourings, Patent Blue deleted from permitted list, Violet and Brown dyes now more accurately described. (The list of permitted colours is now uniform in all States.) When a dye is mixed with a diluent the label shall state the proportion.

Artificial Sweetening Substances (Reg. A. 05)

A new sub-clause to clause A. 05. 004 provides that the permitted amounts of sweeteners refer to the food as consumed.

Vitamins and Minerals (New Reg. A. 10)

The new regulation is that recommended by the N.H. & M.R.C., a modification of the draft proposed by C.A.F.T.A. The regulation controls the addition of vitamins and minerals to foods and the advertising thereof.

Modifying Agents (New Reg. A. 11)

This new regulation is the Food Additives regulation recommend-

ed by the N.H. & M.R.C. It lists prescribed modifying agents and prohibits the addition of any emulsifier, stabilizer or modifying agent unless specifically permitted.

Dietetic, Special Diet or Invalids' Foods and Low Calorie Foods (Reg. B. 06)

The Invalids Food regulation has been replaced by that recommended by the N.H. & M.R.C. The regulation now provides for Low Calorie Food, the carbohydrate content of which is limited. A Low Calorie Food may contain limited preservative, artificial sweeteners and certain modifying agents. There are strict labelling provisions.

Meat and Meat Products (Reg. C. 01)

The regulation has been replaced by that recommended by the N.H. & M.R.C. (prior to the amendment re meat flesh), with the exception that instead of prescribing a maximum fat content for sausage meat, a minimum fat-free meat is prescribed.

The essential changes are a minimum starch (as well as a maximum) content of sausage meat, minimum meat content, but no limits for fat or starch, or manufactured meat, restriction of smoking to action of wood smoke, limited inorganic phosphate may be added to sausage meat and manufactured meat (as well as to corned, pickled, cured or salted meat); ascorbic or iso-ascorbic acid may be added to corned, pickled, cured or salted meat or to cooked manufactured meat.

Canned Meat and Canned Meat Products (Reg. C.02)

A new clause C.02.012, based on a recommendation by the N.H. & M.R.C., has been inserted defining canned meat balls, canned hamburger and canned rissoles. A minimum meat content is prescribed.

Fish and Fish Products (Reg. D.01)

The regulation has been replaced by that recommended by the N.H. & M.R.C. The change introduces definitions for fresh or Chilled Fish; Frozen Fish; Smoked Fish; Salted Fish. Labelling requirements apply when fish is sold under a descriptive name.

Oysters and Other Shell Fish (Reg. D.04)

The regulation has been amended to correspond to the wording recommended by the N.H. & M.R.C. The only essential change is the change of labelling requirement "Date of removal from shell" to "Date of packing or bottling".

Jelly Crystals (Reg. E.02)

The regulation has been replaced by the standard recommended by the N.H. & M.R.C. The new regulation defines Jelly Crystals, Tablets, Cubes and Mix, the latter may be prepared from a vegetable gelling substance as listed. Labelling requirements are prescribed.

Condensed Milk (Reg. H.07)

The regulation has been replaced by the standard recommended by the N.H. & M.R.C. with the additional provision that unsweetened condensed milk, unsweetened and sweetened condensed skim milk shall be free from odours and colours foreign to the fresh preparation. The only essential change is the deletion of standards for concentrated milk.

Malted Milk Powder (New Reg. H.09)

This new regulation is that recommended by the N.H. & M.R.C.

It defines the product, prescribes minimum limit for milk fat, maximum limits for moisture and salt, and requires airtight packages for retail sales.

Flavoured Milk (New Reg. H.10)

This new regulation is that recommended by the N.H. & M.R.C. It defines Flavoured Milk and Flavoured Skim Milk, allows certain emulsifiers, sets a minimum of 8 per cent S.N.F. (also 3 per cent fat in Flavoured Milk). Labelling provisions are included.

Cocoa (Reg. K.03)

In clause K.03.001 Cocoa Bean has been redefined.

In clause K.03.004 "fat-free" is inserted after "alkali-free".

In clause K.03.005 "fat-free cocoa content" is changed to "fat-free and alkali-free cocoa content".

New clause K.03.007 allows addition of lecithin or ammonium phosphatide to cocoa and preparations of cocoa.

Chocolate (Reg. K.04)

The milk chocolate clause, K.04.002, has been amended to provide a minimum non-fat milk solids content, and to permit the milk fat to be replaced wholly or in part by cocoa fat in Easter Eggs; Seasonal Novelties and other hollow goods. In such cases there is a prohibition on the use of certain words in the label.

Clause K.04.003 has been amended to permit glycerides as well as sodium alginate in cocoa (or chocolate) and milk. Clause K.04.007 has been amended to also permit the addition to cocoa, chocolate and preparations of these, limited amounts unavoidably included of Carnauba Wax, Beeswax or Shellac and limited amount of Purified Talc.

Confectionery (Reg. M.04)

The presence is now permitted of certain additives unavoidably included.

Marzipan (New Reg. M.05)

This new regulation is that recommended by the N.H. & M.R.C.

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Ice-Cream and Related Products — Mixes (Reg. N.04)

A new clause has been inserted defining Dairy Ice Mix as recommended by the N.H. & M.R.C.

Lemon Butter, Fruit Flavoured Spread and Fruit Flavoured Filling (Reg. O.05)

The regulation has been replaced by the original standard recommended by the N.H. & M.R.C. This defines Lemon Butter and sets minimum limits for butter and egg solids. It defines Fruit Flavour Spreads (or Fillings) and Imitation Fruit Flavoured Spreads (or Filling) and for these products sets a fat minimum and permits a limited amount of prescribed modifying agents. There are prescribed labelling requirements.

Ale, Beer and Stout (Reg. Q.04)

In clause Q.04.002 "by volume" is deleted.

Clause Q.04.003 is amended to permit the presence of cobalt, up to 2 per cent calculated as the chloride, in ale, beer, porter or stout.

Fees for Analysis (New Reg. Y.01)

A list of fees to be charged by analysts for the analysis or examination made for or in respect to food or drugs is given. These correspond to those recommended by the R.A.C.I.

NOTE: All the foregoing changes have been incorporated in the new loose-leaf set of W.A. Food & Drug Regulations available from the Government Printing Office, Station Street, Wembley, W.A., at a cost of 15/- each, plus 1/- postage.

THE INFLUENCE OF FOOD PROCESSING ON AGRICULTURE — A SYMPOSIUM

A symposium on "*The Influence of Food Processing on Agriculture*" will be held at the Launceston Teachers' College on 20th May, 1965.

It is being organized by the Tasmanian Branch of the Australian Institute of Agricultural Science.

PROGRAMME:

a.m.: Opening and announcements.

"*The Influence of Food Processing on Tasmanian Agriculture*", F. W. Walker, Chief Horticulturist, Tasmanian Dept. of Agriculture.

"*The Factors Influencing the Location and Operation of Processing Plants*", Bill Walker, formerly of Kraft Foods Ltd., Melbourne.

"*Dairy Processing — the Present Position and Future Possibilities*", G. Loftus-Hills or R. A. Buchanan, C.S.I.R.O., Division of Dairy Research, Melbourne.

p.m.: "*The Development of Vegetable and Fruit Processing in Tasmania*", S. M. Sykes, C.S.I.R.O., Division of Food Preservation, Hobart.

"*Research in Food Processing; Recent Findings and Possibilities*", Dr. J. R. Vickery, C.S.I.R.O. Division of Food Preservation, North Ryde, N.S.W.

Summing up and discussion, Professor C. C. Wade, Professor of Agriculture, University of Tasmania, Hobart.

Buffet Dinner.

The symposium is open to persons connected with agricultural and food processing industries as well as to members of the Institute. The approximate cost will be 25/- which will include the Buffet Dinner and a copy of the proceedings.

The Organizing Secretary is Mr. P. J. Fountain, P.O. Box 58, Launceston South, Tas.

MARKETING OF SHELL EGGS AND EGG PRODUCTS

The results of a recent examination of the quality of eggs available to the Australian consumer are discussed, and the methods available for raising the quality of shell eggs purchased are described.

F. S. Shenstone and J. R. Vickery. Proc. Australas. Poultry Science Convention, 1964. pp. 70-3.

Properties of Oriented Polypropylene Films

By H. A. RIGBY,

Imperial Chemical Industries of Australia and New Zealand Ltd.

(Continued from Vol. 17, No. 4, page 210)

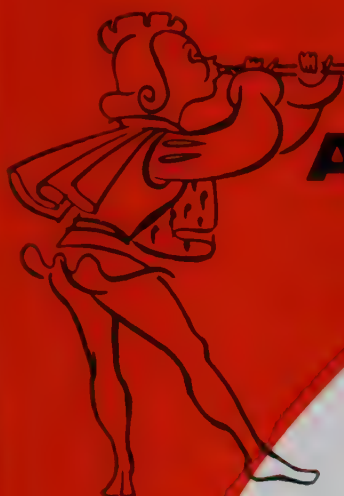
This brief survey of the properties of oriented polypropylene films indicates that they bear greater similarity to cellulose films than to unoriented polyolefin films. This is also true in respect to their *handle*, since their stiffness is greater than or similar to that of cellulose film at the same thickness and because their tear characteristics permit the use of tear tapes.

The mechanical properties of oriented polypropylene film imply that it should be possible to use it at a lower thickness for a given service than is necessary or possible with cellulose film. It is considered that a 50 gauge (12.5 micron) uncoated, or a 65 gauge (16 micron) coated, biaxially oriented polypropylene film will in many instances give a satisfactory wrap where cellulose film is used today.

This leads to the question of the machinability of these new films. On wrapping machines this generally involves questions of feeding, cutting, folding and sealing. The uncoated oriented films were not initially available in antistatic forms, and feeding problems were likely to be encountered if a film could be deflected from its path because of static charges. This problem could be overcome to a considerable extent by the use of ionization devices, but antistatic film is now available and this facilitates feeding and eliminates dust pick-up in the final wrapped article. The cutting of oriented polypropylene film presents no problems provided that the

knives are sharp and accurately adjusted. Folding may call for minor adjustments to produce tight wraps but should otherwise present no problems. The sealing of uncoated film, however, does present some difficulties. The equipment normally used with cellulose films has been designed to seal the coatings applied to these films and not the base films themselves. The standard sealing devices cannot therefore be used satisfactorily with uncoated polypropylene film. Machines which have been modified to handle plastic films will in some cases handle uncoated oriented polypropylene films successfully, but relatively few of these machines are in use today. New devices are being developed to produce satisfactory seals with uncoated oriented film, but it is likely to be some years before these are widely established and new machinery is designed specifically to handle the uncoated film.

In the meantime, therefore, the use of a coated film similar to that described in the above tables is likely to be of greatest interest in the field of packaging. The film is protected against static charges and it has been fed successfully on a wide range of wrapping machines. Once again there are no problems in cutting and folding, and since the coating can be heat sealed to itself at temperatures in the range of 110-140°C it can be used successfully on a wide range of wrapping equipment which has previously been



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used almost exclusively with cellulose films. The only modification which has been necessary in most cases has involved the installation of thermostatic temperature controllers, but these need not be expensive and they do give improved performance even with the materials used previously.

While the seal strengths obtained in laboratory tests with coated oriented polypropylene films are today lower than those obtained with cellulose films, it must be noted that the laboratory tests are carried out under idealized conditions which are seldom reproduced when wrapping in a factory. Shelf life trials have been carried out by many potential consumers, and these have almost invariably shown that the shelf life of a product wrapped in coated oriented polypropylene films is as long as, and in many cases longer than, that of a product wrapped in polyvinylidene-chloride-coated cellulose film. The superior performance of the finished wrap must be attributed to the easier attainment of seal perfection at the low sealing pressures often used in practice, which in turn can be attributed to the more intimate contact achieved between thin films which gives more uniform pressure distribution and heat transfer.

It is too early to say categorically where oriented polypropylene films will be used in the future, but it is already clear that the coated films will compete effectively in many applications where cellulose films are used today. Also, in view of the excellent properties of the base film, it is likely that in the years to come it will itself become a major film used for protective and display packaging. The fact that these films can be used thinner than can cellulose films may give them price advantages, but they will be used because they are eminently suitable for use in display and protective packaging. The fact that the base film is itself an excellent moisture barrier and does not absorb mois-

ture is a distinct advantage, since special storage conditions are not required and the appearance of the film will not deteriorate on a finished package. The excellent low-temperature properties also offer distinct advantages compared with cellulose films, and another factor likely to increase in significance is that it is possible to tighten an oriented polypropylene film overwrap by shrinking to a very limited extent in a hot air tunnel, thereby removing ripples and improving the appearance of the product.

It is not necessary to discuss in detail the applications for which cellulose films have been used to date. It does now appear probable that cellulose film will in the future meet strong competition from oriented polypropylene films in one of their several forms. Applications such as overwrapping, form and fill, lamination, bag-making and cut sheet merit early examination by potential consumers.

The possibility of inducing a minor degree of shrinkage in an oriented polypropylene film has just been mentioned. This comment referred to a film which had been heat set, *i.e.* dimensionally stabilized against shrinkage at elevated temperatures so as to minimize the possibility of shrinkage during normal processing operations. It is, however, possible to select orientation conditions so as to deliberately increase the tendency of the oriented film to shrink when subsequently heated in hot air to temperatures in excess of 130°C. Shrinkages of over 25 per cent in both machine and transverse directions can be achieved, and this makes shrinkable polypropylene film an important candidate in the growing field of shrink packaging. A balanced shrinkable film would have the mechanical properties of the balanced oriented film described previously. It would mainly be used for display packaging, since it is not yet possible to guarantee that hermetic seals would be produced with the sealing techniques recom-

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mended. The film would normally be sealed loosely around a package using thermal impulse or hot wire techniques and the package would then be passed through a hot air tunnel to effect shrinkage. The use of shrinkable polyvinyl chloride film

called for, and, if this is successful, it appears likely that some of the articles which are today over-wrapped in cellulose film will in future be shrink-wrapped in polypropylene.

To summarize, it can be said that while oriented polypropylene film is one of the newest packaging materials in the world, it is one that has great growth potential and should be given careful consideration where display or protective packaging is required.

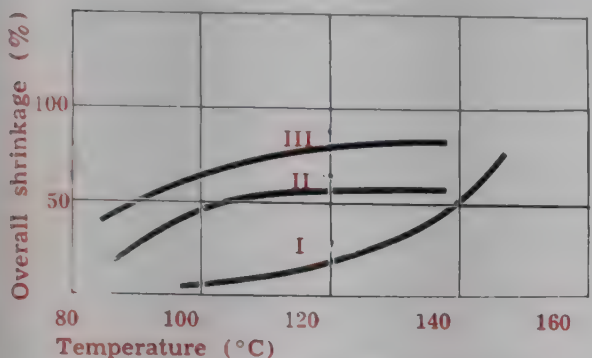
Personal . . .

Mr. J. Fairbrother, Officer-in-Charge, Army Food Research Station, Scottsdale, Tasmania, has been awarded a Commonwealth Public Service Board post-graduate scholarship. This is one of eight scholarships granted in 1964 for two years' study outside Australia.

Mr. Fairbrother is taking a course of post-graduate study in the field of production evaluation of dehydrated and freeze dried vegetables and other foods at Ohio State University. He is registered in the Graduate School for study towards a higher degree and is working with Dr. Wilbur A. Gould, Head of the Department of Food Processing and Technology in the Department of Horticulture, College of Agriculture.

During his stay in the U.S., Mr. Fairbrother will spend some time at the Armed Forces Food and Container Institute, Natick, Mass., and will visit the larger food research establishments and food processing plants in the United States.

Mr. Fairbrother who is accompanied by his wife and three children is a graduate of Duntroon Military College and received his B.Sc. in Food Technology with first class honours at the University of New South Wales in 1960. In 1962 he transferred to the C.M.F. and currently holds the rank of major in the R.A.A.S.C. He will be doing a certain amount of overseas military training whilst absent from Australia.



Variation of shrinkage with temperature of some plastic films

I Polypropylene, II Polyester, III Polyvinyl chloride.

has already become established in some parts of the world, and attempts have been made to use shrinkable polypropylene film on equipment designed for use with polyvinyl chloride film. These have generally been unsuccessful because polypropylene film has different shrinkage characteristics, as shown in Figure 1 overleaf.

If a given degree of shrinkage is required to tighten the surplus film around a package, it is clear from the curves in Figure 1 that the temperature range in which acceptable shrinkage will occur with polyvinyl chloride film is wider than that for polypropylene film. Therefore, for polypropylene film, more accurate control of the temperature of air in a shrink tunnel is essential, and it is also necessary that the film around the article should be heated as uniformly and quickly as possible. These more stringent equipment requirements have slowed down the development of the use of shrinkable polypropylene film, but satisfactory equipment is now available in several countries and in view of the attractive appearance of the finished article this market is likely to grow in importance in the years ahead. Further mechanization of the shrinking process will be

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BOOK REVIEWS

- "ANALYSIS AND CHARACTERIZATION OF OILS, FATS AND FAT PRODUCTS": Volume 1. By H. A. BOEKENOOGEN (Ed.), 420 pages. Interscience Publishers (John Wiley & Sons) London, New York and Sydney. 1964. £6.7.6.

There is a large literature on analytical methods in the analysis of fats and oils, a literature kept up to date by the vigilance and publications of various professional organizations. Since modern methods of analysis also call for analysts to be competent in the use of modern analytical techniques, they are also helped by many books and journal publications on progress in instrumentation.

The book under review is the first of a series to serve the needs of those who want to keep up to date on the methodology and the interpretation of analytical results in the field of fats and oils.

The nine articles are written by authors from Industry (German and British), University (Belgian) and Research Institutes (American, Dutch and Spanish).

The following topics are being treated in this volume: classical chemical methods in fat analysis, the assay of essential fatty acids, the application of urea inclusion compounds in fat analysis, dilatometry of fats, the analysis of butter and cheese, the analysis of monoglyceride and related emulsifiers, the determination of foods in oils, especially linseed oils, nuclear magnetic resonance spectroscopy as a tool in fat chemistry and the use of ion-exchangers for the analysis of detergents.

The book is well produced.

Reviewer: Professor F. H. Reuter, The University of New South Wales, Sydney.

- "PROTEINS AND THEIR REACTIONS", A Symposium on Foods, by H. W. SCHULTZ and A. F. ANGLEMIER (Eds.). 472 pages. The Avi Publishing Co., Inc., Westport, Conn. 1964. \$3.50.

This book contains the nineteen papers which were presented at the third symposium on foods organized by the Department of Food Science and Technology, Oregon State University, Corvallis, Oregon. The book is divided into five sections, the first three covering proteins and protein complexes generally while the last two sections cover proteins from specific sources and the biological effects of protein interactions respectively. The editors say that the book is intended for use by scientists interested in foods or proteins or both. While it is undoubtedly of interest to scientists in these fields it, of necessity, can only give a broad and general outline of so vast a field. As was undoubtedly intended by the organizers both the symposium and the book will be of more use to the food scientist than the specialist protein chemist.

The chapter on protein-lipid complexes by Cornwell and Horrocks and the chapter on protein-carbohydrate complexes by Jevons show the present emphasis on the association of proteins with other materials. Colvin's chapter serves a useful purpose in pointing out once more the ambiguity of the term denaturation although it is doubtful if the word will ever disappear from scientific literature as he would wish it to do. Wall treats the cereal proteins at some length with most emphasis on wheat. He presents the Peoria group's suggested structure for wheat gluten based on their studies of changes brought about by reduction of sulphhydryl groups followed by reoxidation in solutions of different protein concentration.

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There are a number of aspects of protein chemistry which were not dealt with. Noteworthy among these is the subject of protein separations. This is undoubtedly of great significance to many food scientists and although mention of techniques is made by a number of authors, an integrated paper on the subject at the symposium would certainly have added to its usefulness.

Unlike some other books on the structure and reactions of proteins this publication is extremely readable and serves a very useful purpose in providing background information for the food scientist.

Reviewer: Dr. J. W. Lee,
C.S.I.R.O., Wheat Research
Unit, North Ryde, N.S.W.



- "THE COMPOSITION OF FOODS: FOOD COMPOSITION TABLES" ("Die Zusammensetzung der Lebensmittel: Nährwert — Tabellen"), by H. BOSCH. (Editorial Board: S. W. Souci, W. Fachmann and H. Kraut), Part II: 200 pages (Loose leaf in ring binder). Wissenschaftliche Verlagsgesellschaft m.b.H., Stuttgart, 1964. DM 40.—.

Part II of the set of German food composition tables enlarges the usefulness of this work by providing data for a further 200 raw or technically processed foods.

The nutrient values of these further foods are tabulated in a similar manner to those of Part I* — in a ring-book form, allowing one page for each food. Part II is supplementary to, and not very useful without, Part I. In fact instructions are given for the redistribution of the folio sheets, so that foods classified in Groups A to K are in Part I, and those L to V in Part II. Additional foods have been added to most of the original classification groups and four new groups (sugar and confectionery, beers, yeasts and sauces) have been included in this second volume.

*Reviewed this Journal p. 605, 1963.

The introduction to the first is applicable for both parts, but the Subject Index has been revised and new pages provided to replace those of Part I.

Information, not readily available elsewhere, is thus provided for some 400 different foods in these two volumes of "Food Composition Tables" published by authority of the German Federal Ministry of Food, Agricultural and Forestry. Used in conjunction with local, less comprehensive, food composition tables, this German work should prove most valuable to persons engaged in calculating the nutritive value of meals. A further volume of 200 folios is planned, and this will also contain a bibliography relating to the contents of the three instalments.

Reviewer: Margaret Corden,
Australian Institute of Anatomy, Canberra, A.C.T.

F.T.A. of Victoria

A function was held at the William Angliss Food Trades School, Latrobe Street, Melbourne, on 18th March, 1965.

The evening took the form of a Cutting Bee, commencing at 5.30 p.m. followed by a Buffet Dinner.

Foods cut were Frozen Fish Fingers, Frozen Peas, and Ice Cream. At the Cutting visitors were given a form to fill in with their assessment of the food in question and, later during the evening, they were able to compare their findings with those of an expert Panel who had tested the food previously under the same conditions. They were also given the opportunity of tasting the traditional Japanese drink Saki, served in Japanese style.

A short talk was given by Chef A. Surwald on Frozen Foods, their preparation and value.



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BOOKS, PAMPHLETS, etc.

"CHIPS AND OTHER FOOD ITEMS FROM DEEP-FAT FRIED MUSHROOMS"

By Reba B. Greenspun, Edward G. Kelley, and W. L. Porter, U.S. Agricultural Research Service, A.R.S. 73-44, 8 pp. 1964.

A study was undertaken at the Eastern Utilization Research & Development Division, Agricultural Research Service, U.S. Department of Agriculture, Philadelphia, Pa., to determine the suitability of preparing mushrooms in the chip form using the commercial variety, *Agaricus campestris*. Mushroom slices were cooked by a French-frying process similar to that used in the preparation of beet, carrot and parsnip chips and pea and lima bean nuggets as well as sweet potato chips already reported from this laboratory. Various sizes were used, from buttons to overmature mushrooms. Special attention was given to the larger mushrooms generally considered to be commercially unacceptable. Cooking conditions are described and the moisture content before and after frying are reported. Data on yield, oil content and protein content are also presented. Rehydration of the chips and their use in the preparation of soups and sauces is described.

"Report of the Meeting on the Wholesomeness of Irradiated Foods"

Held in Brussels, 1961, with exclusive reference to the evaluation of nutritional adequacy and safety for consumption. 40 pages. Food and Agriculture Organization of the United Nations. Rome. 1962.

"Economic Enquiry Into Food Marketing"

The Frozen Fruit, Juice, and Vegetable Industry. 145 pages. U.S. Federal Trade Commission, Washington, D.C., 1962.

"BINSTED'S DIRECTORY OF FOOD TRADE MARKS AND BRAND NAMES," 3rd Edition

By E. & A. Binsted (Eds.). 467 pages. Food Trade Review, Ltd., London. 1965. £4.0.0.

This Directory, now in its third edition, is the only one of its kind in the world devoted entirely to trade marks and brand names of foods and food products. Such a Directory is invaluable to everyone concerned with the buying, marketing, selling, importing or exporting of manufactured foods and food products.

It contains every known trade mark and brand name of foods and food products manufactured in the United Kingdom and of those regularly imported into that country.

A foreword to the Directory gives some useful notes on the selection and protection of Trade Marks, information which everyone contemplating applying for registration of a new Trade Mark should study.

One section gives names and addresses of owners and users of British Trade Marks and brand names, also owners and users of foreign Trade Marks and brand names in use in the United Kingdom.

"Pathogenic Organisms in Relation to Pasteurized Cured Meats"

By J. I. Anderton. British Food Manufacturing Industries Research Association. Scientific and technical survey 40. May, 1963.

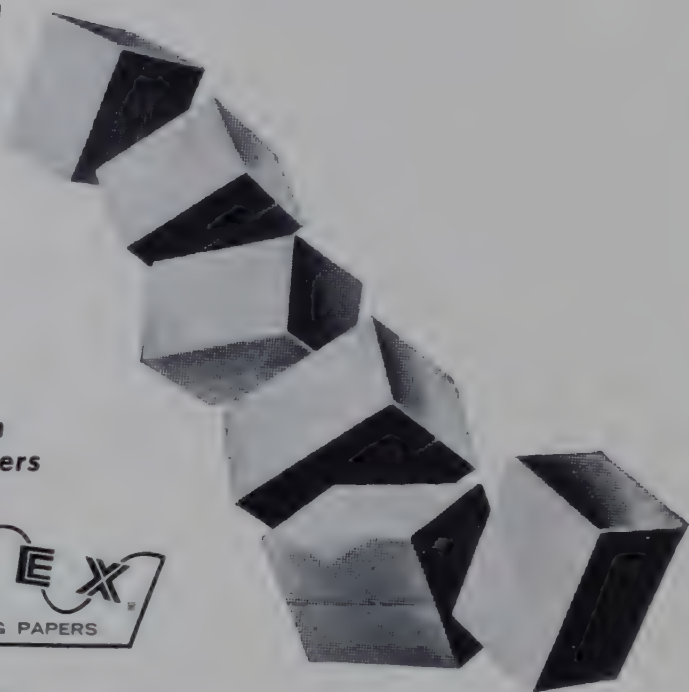
"Physiological and Behavioural Aspects of Taste"

By M. R. Kare and B. P. Halpern (Eds.). 149 pages. University of Chicago Press, Chicago. 1961.

"COCONUTS"

By R. Child (Tropical Agricultural Series). 216 pages. Longmans, Green & Co. Ltd., London. 1964. £2.2.6.

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"Suspected Occurrence of *Byssochlamys Fulva* in Queensland-grown Canned Strawberries", by M. M. Spurgin.

"An Evaluation of New Varieties of Beetroot for Canning Purposes", by D. Winterton.



"GENETICS OF VECTORS AND
INSECTICIDE RESISTANCE"

Report of a W.H.O. Scientific Group. World Health Organization: Technical Report Series, 1964, No. 268; 40 pages. 3/6. Also published in French and Spanish.



"LEGUMES IN HUMAN
NUTRITION"

By W. R. Aykroyd and J. Doughty. 318 pages. F.A.O. Rome. 1964.

It is a vital part of the Freedom from Hunger Campaign to spread knowledge and understanding of the magnitude of the hunger problem. This brochure is one of many published by the Food and Agriculture Organization of the United Nations which tries to show what can be done about it.

Dry legumes have occupied an important position in human diets since agriculture began and man adopted a settled life. They still do, but it is a general observation that the consumption of legumes falls as standards of living rise.

Legumes are a food whose high nutritional value has been recognized since remote antiquity, but

one which suffers in prestige because of low cost and the role it plays in times of emergency.

This little book may somewhat help to retard their disappearance from the tables of the well-to-do. It is, however, primarily devoted to the cause of the 1500 million inhabitants of the developing countries where meat is a food eaten on rare festive occasions and where protein malnutrition remains the major problem of nutrition.

The author was the Head of the F.A.O. Nutrition Division. Chapter headings are: history of legumes, production and consumption, composition and nutritive value, methods of processing and cooking, effects of processing on nutritive value, toxic substances, legume proteins, observations on the value of legumes in human feeding and the place of legumes in human diets.

F.H.R.



"Encouraging the Use of
Protein-rich Foods"

By J. Fridthjof. 103 pages. Food and Agriculture Organization of the United Nations. Rome. 1962



"COMMON INSECT PESTS OF
STORED FOOD PRODUCTS"

By H. E. Hinton and A. S. Corbet. A guide to their identification. (Eleven orders are dealt with.) (4th Edition.) 61 pages. British Museum (Natural History). London, 1963.



"Selected Writings on Freeze-drying
of Foods"

By Kermit Bird. U.S. Dept. of Agriculture, Economic Research Service, Washington, D.C., 1964.



"THIN-LAYER
CHROMATOGRAPHY"

By J. M. Bobbitt, Reinhold Publishing Corp., New York, 1963.



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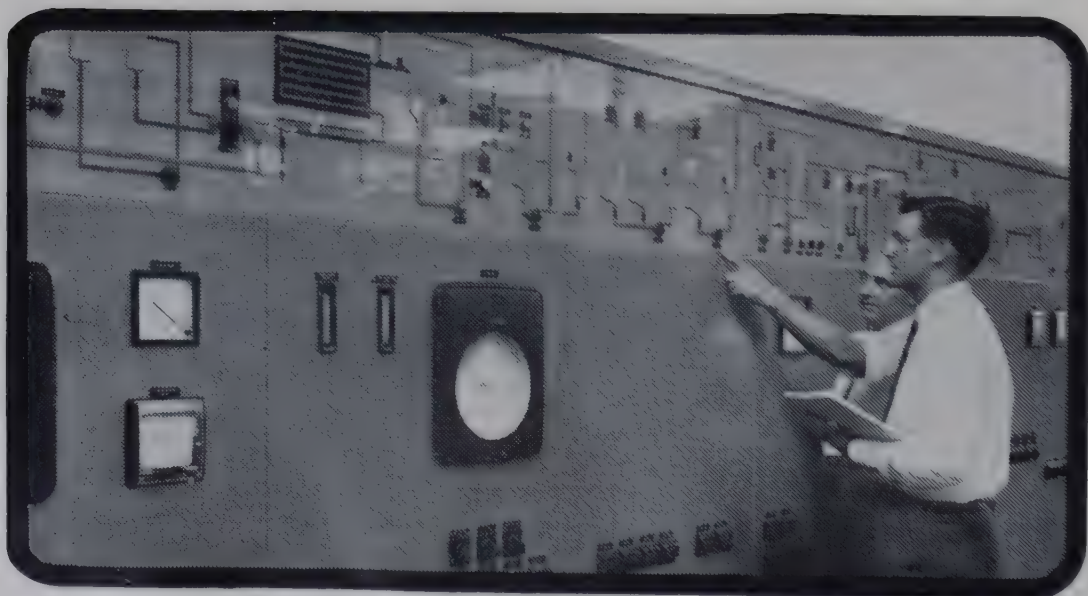
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N. B. LOVE — New Glucose Plant

A modern plant to produce glucose from wheaten starch has been installed in a new factory by N. B. Love Sugars Pty. Ltd. The plant at Enfield, a suburb of Sydney, commenced production in February.

Designed and manufactured by Karl Kroyer of Denmark, it is capable of producing 24 tons of high quality glucose syrup every 24 hours. The first of its type ever to be installed, it is claimed to be the most modern, highly instrumented continuous glucose plant in the world.

Glucose manufacturers have been aware for some considerable time of the advantages of continuous processes for starch conversion, neutralization, filtration and evaporation. This is considered essential for the uniformity of the finished glucose and economic production.

The plant is capable of producing glucose and/or syrups of various specifications at present used by food manufacturers in Australia. It is also likely that standards previously considered unattainable will be achieved.

Newcomers to the glucose field, N. B. Love, with a background of successful flour milling together with starch and gluten production, appreciate the benefits derived from the close control of raw materials to ensure consistent quality in the finished product.

An important feature of the plant is the newest *set-up* for enzyme conversion which will enable the plant to cover the range of acid, enzyme, and double enzyme products. The plant is fitted with equipment for the automatic control of the starch slurry supply, preheating and acidification of the starch slurry, and for final pH adjustment of the hydrolysate.

The acidification process is panel controlled to ensure consistent D.E. value of the finished syrup.

The converter consists of heated pipes, through which the acidified starch slurry is pumped by a pulsating pump under pressure. The converter is designed to prevent the liquid boiling.

From the converter the liquid passes through the heat exchanger which controls the degree of conversion, *i.e.*, the D.E. value of the final syrup. Then it is partially neutralized and passed on to the rotary drum filter.

Here it is further neutralized by a dosing pump.

The rotary drum filter designed by Karl Kroyer especially for glucose production ensures a good initial clarification of the raw juice before treatment with the activated carbon. After discolourization and final filtration, the juice is water-white, which either goes to the ion exchange equipment or straight to the evaporator. The ion exchanger further reduces impurities, particularly nitrogenous matter in the syrup.

The evaporator, was especially designed for glucose production.

The finished syrup is delivered by bulk road tanker to customers.

The whole production process is controlled from a single panel.

TEAR-OFF BOTTLE CROWN

American Can Co. has introduced an easy-open tear-off bottle crown, made of aluminium, for use on conventional 26 mm beer and soft drink bottles; it is an adaptation of the crown developed for the 43 mm glass *mug*.

Food Technology in Europe

(Continued from Vol. 17, No. 4, page 202).

MEAT

The session dealing with meat was presided over by Dr. M. Ingram and two papers were presented:—

UNPROCESSED MEATS, by Dr. R. A. Lawrie, L.T.R.S., Cambridge.

Meat research was concerned with the entire life-history of the animal from conception to slaughter. Several phases of meat research could be distinguished, *e.g.* (1) intra-uterine growth and development after birth, (2) slaughter of the animal, (3) conversion of muscle into meat by post-mortem glycolysis, (4) storage and preservation and (5) cooking and mastication.

A considerable degree of control over growth has been achieved by artificial insemination. Recent work has resulted in the separation of male and female determining spermatozoa, making it theoretically possible to control the sex ratio and ova transplantation permits an increase in the number of progeny of female animals with desired characteristics. It has been shown that the position of the embryo in the uterus affects its growth and this fact may provide another means of regulating intrauterine growth.

After birth growth can be influenced by a number of different factors, of which the place of nutrition is a very important one. The growth rate of individual pigs in the same litter is determined by the suckling order: those suckling from the anterior mammary glands receive more milk and grow faster. Hormones exert a great effect on animal growth: stilboestrol implantation results in a lean type of meat, the growth hormone from the pituitary gland acts specially on mandibular and pectoral muscles, andro-

gens and progesterone enhance growth. Tranquilizers and antibiotics have been found effective in enhancing growth, presumably by overcoming stress and controlling subclinical infections.

Slaughter is a very brief phase, but affects meat quality considerably. For instance, electrical stunning of pigs must be followed by rapid severance of the jugular vein to avoid *blood splash* in the muscles. Muscle is converted into meat in the first 24-36 hours after death. The failure of the circulation of the blood on muscle glycogen is the dominant feature of this phase. In life, Glycogen is oxidized to carbon dioxide and water, but after death glycolysis stops at the lactic acid stage and the pH of the tissue falls. The rate and extent of this process affects meat quality. In general, the redder muscles have a slower rate of pH fall.

The extent of the pH fall is also related to water-holding capacity: high pH is associated with high water-holding capacity and *vice versa*. High water-holding capacity may be an advantage for A.F.D. meat, because it aids rehydration.

Storage of meat beyond a few days involves preservation against bacterial spoilage. Chilling at 0°C permits meat storage for about six weeks: this makes it possible to send chilled beef from Argentina and New Zealand to the U.K. During this time the meat becomes more tender, possibly due to the action of proteolytic enzymes. Freezing permits storage of meat for years. The chief drawback of freezing is the exudation or *drip* on thawing. Methods designed to avoid drip, such as extremely rapid freezing rates, are at present impracticable commercially. Ionizing radia-

tion has been used for the long-term preservation of meat but the dose required unfortunately produces marked off-odours and off-flavours. Dehydration, particularly A.F.D., is another method of preservation.

The eating quality of meat is revealed after cooking and mastication and involves tenderness and flavour. Efforts have been made to increase tenderness by injecting proteolytic enzymes into animals pre-slaughter, but an excessively tender product may result.

In Europe generally there is less demand than formerly for fat meat, also large joints are no longer as popular as they used to be. Pre-packaging is becoming more widespread, which brings its own problems, e.g., in the type of micro-organisms which can thrive on the meat and also the increased importance of appearance.

MANUFACTURED AND PROCESSED MEATS, by Mr. S. Vahlun, Danish Meat Research Institute, Roskilde.

The advent of self-service shops and supermarkets has necessitated innovations in the meat industry, because meat products must be suitable for display and sale in supermarkets. The consumer is attracted by meat of high quality and pays attention to characteristics, such as colour, leanness, palatability and keeping quality, as well as to the package in which the product is presented. Food legislation also tends to raise the standards of hygiene and quality and thus to create the need for improvements in technology.

Curing ensures preservation of raw meat and improves its palatability and colour. The colour-forming ingredient used is almost exclusively nitrite, of which the maximum permitted level in the finished product is 200 ppm in some countries, while the maximum level in the pickle is 2 g/l.

Uncooked meats, such as Wiltshire bacon, are tank-cured and

rubbed with dry salt. Only about 30 per cent of the salt content is injected. The curing time is 7-10 days. For sliced prepacked bacon as well as for canned hams, uniform salt distribution, a long shelf-life and good colour stability are essential. The degree of saltiness of the product depends less on the absolute salt concentration than on the ratio between salt content and water content. An increase in the number of stitches per unit area improves the salt distribution and curing of bacon by multi-needle injection is becoming an accepted method. The quantity of pickle injected amounts to 6-10 per cent of the weight of the meat and the final salt content is about 9 g salt per 100 g water. Quick and uniform salt distribution can also be achieved by curing sliced meat.

Products cooked in large pieces, such as hams, foreends and shoulders, are now cured mainly by multi-needle injection or artery pumping. The latter gives a good salt distribution in meats with a good capillary network, but must be combined with stitch pumping in hams and foreends. A bacteriological problem created by the new techniques is the transfer of bacteria from the surface into the interior of the meat. Alkaline polyphosphates are added to the pickle in many countries to reduce jelly formation during cooking and to improve the taste of the product. Ascorbic acid is not very widely used for improving the colour of bacon and hams.

Smoking produces surface preservation and a characteristic flavour. Hardwood sawdust is used for generating the smoke and much work has been carried out on the composition and the bacteriostatic effect of the smoke.

Thermal processing can be carried out at two levels: (a) pasteurization to increase the shelf-life at refrigeration temperatures and (b) heat treatment to prolong shelf-life at room temperature. The heating temperatures and times are based on the thermal death times of micro-organisms of current interest.

The latest developments in thermal processing aim at products of the highest quality with a minimum amount of jelly in the tin.

Freezing is the method of preservation used specially for fresh meat, certain types of sausages and some ready-cooked meat dishes. Cured products are not usually suitable for freezing.

The effect of the temperature and time of storage on the organoleptic quality of frozen foods has been thoroughly investigated in the U.S.A. It was found that the logarithm of the storage time at which deterioration set in was linearly related to the storage temperature. Moreover, the effects of storage at various temperatures on a product are cumulative, regardless of the order in which they occur.

The condition of the product before freezing exerts a far greater effect on its behaviour during storage than the rate of freezing, with the exception of very slow freezing rates. The Danish Academy of Technical Sciences recommends a minimum freezing rate of 0.2 cm/h., but suggests that 0.5 cm/h., should be aimed at. With regard to storage temperatures, -22°C is recommended for pork and -15°C for beef; transport and display temperatures should not rise above -15°C .

Packaging has assumed increasing importance in recent years. Fresh meat is wrapped in films which possess some permeability to oxygen, while cured meat products are packed in films with as low an oxygen permeability as possible.

Freeze-drying and irradiation of meat products are modern methods of preservation which are gradually becoming accepted in the industry. Irradiation may be combined with mild heat treatment to prevent the off-flavours produced by irradiation alone.

DISCUSSION

Dr. Kidney (T. Wall & Sons Ltd.) opened the discussion and pointed out that many different scientific disciplines were involved in meat

research, ranging from genetics to preservation. The tempo of meat research had accelerated recently and was receiving considerable impetus from exchange of information and visits between Eastern and Western Europe. *Dr. Kidney* referred to the high standard of hygiene in pre-packed meats, and to the fact that hams in the U.S.A. which were pumped to 20 per cent added moisture, and were accordingly labelled *water added*, were finding a ready sale. Their palatability showed the danger inherent in defining quality entirely from arbitrary standards. He also stated that many problems in meat research were still awaiting solution, e.g. differential ageing rates in pork and beef, pale muscle on one side of the carcass only and the many aspects of the chemistry of curing.

Mr. Breen enquired how long cattle were in transit from the farm to the slaughterhouse and was informed that this may be up to two days. He asked whether sugar feeding prior to transport improved meat quality. *Dr. Lawrie* replied that this practice was considered in Denmark to prolong the keeping quality of pig meat but *Mr. Jul* stated that sugar feeding has been discontinued in Denmark. In answer to the question about the meat colour of calves, *Dr. Lawrie* said that the low iron content of their diet resulted in the pale colour of the meat.

With regard to the American practice of curing hams with 2.5 per cent salt and 1.5 per cent sugar, *Mr. Breen* wondered whether this would find acceptance in Europe. *Mr. Vah-lun* replied that in Denmark sugar tended to be avoided in curing. Ascorbic acid was also little used in curing hams, although it may have a place in rapid curing and in sausage making.

Mr. Stephens enquired whether there was any evidence for the production of staphylococcal toxin on bacon. *Dr. Ingram* replied that staphylococci do not develop on ordinary bacon, as they are displaced by the normal flora; in some



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special products where they could multiply, manufacturers were well aware of the problem and took steps to exclude them.

Mr. Ranken asked Dr. Lawrie to comment on glycolysis and other chemical mechanisms involved in the development of toughness in meat from different species. Dr. Lawrie stated that textural changes were brought about by glycolysis and that this problem was being studied in New Zealand, by investigating the effect of lactic acid on actomyosin. Dr. Ingram commented that the problem was complicated by the lack of a definition of toughness.

To be continued

R.A.C.I. CEREAL GROUP

The 15th Annual Conference will be held from Monday, 27th September to Friday, 1st October, 1965, at the Hotel Florida, Terrigal, N.S.W.

Arrangements for an interesting programme are now well in hand. A significant part of the programme will be devoted to a symposium on *Wheat Breeding*. Invited speakers will present a series of papers outlining the methods, objectives, programmes and achievements of plant breeders.

Other sessions will be devoted to: Experimental Design, Laboratory Management, Enzymes, Yeast and Fat.

REFINED SUGAR

Sales of refined sugar products from C.S.R. Co. Ltd. Australian refineries for the year ended 31st March, 1964, were 554,000 tons, 1.3 per cent more than in the previous year.

Manufacturing customers, who buy about 54 per cent of Australian refined sugar, are taking increasing quantities in the form of bulk granulated and liquid sugar. About one quarter of C.S.R.'s industrial sales are of these products.

In the grocery trade, C.S.R. packaged lines are proving popular with both retailers and housewives, and sales continue to rise.



THE CHEMISTRY AND TECHNOLOGY OF ANTIOXIDANTS

The School of Chemistry, The University of New South Wales, and the Food Technology Association of New South Wales will offer a course of ten weekly lectures dealing with the theoretical background and practical aspects involved in the use of antioxidants, commencing the first week June, 1965.

Lecturers in the course will be Dr. A. Johnson (C.S.I.R.O. Division of Food Preservation, Ryde, N.S.W.), Mr. F. H. Ottaway (Australian Biscuit Company, Sydney), Mr. E. G. Pont (C.S.I.R.O., Division of Dairy Research, Highett, Vic.), Dr. A. K. Sewell (Commonwealth Department of Repatriation, Sydney) and Associate Professor E. R. Cole (School of Chemistry, The University of New South Wales, Sydney).

In outline the course content is indicated by the following lecture headings:—

PHYSIOLOGICAL AND PATHOLOGICAL ASPECTS OF AUTOXIDIZED FATS

CHEMISTRY OF ANTIOXIDANTS

- I — Autoxidation Processes and Modes of Antioxidant Action.
- II — Natural Phenolic Materials.
- III — Synthetic Phenolic Materials.
- IV — Nitrogen Sulphur and Selenium Derivatives.
- V — Efficiency Tests and Design of Model Systems.

TECHNOLOGY OF ANTIOXIDANTS

- I — Use in Flesh Foods and Toxicology of Antioxidants.
- II — Cereals and Cereal Products.
- III — Dairy Products.

CHEMISTRY AND TECHNOLOGY

Review of present position and particular problems.

A brochure providing fuller details of the lectures with information on registration and fees will be available. Enquiries may be directed to Professor Cole (Phone 663 0351, Ext. 2557).

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Institute of Food Technologists

Combined Northern and Southern Australia Sections

15th ANNUAL CONVENTION
AT THE HOTEL AUSTRALIA, ADELAIDE
10th-14th MAY, 1965,

PROGRAMME

MONDAY, MAY 10:

AFTERNOON: Assembly and Registration.

EVENING: Buffet Dinner.

TUESDAY, MAY 11, 1965:

MORNING: Chairman: C. E. C. Sawkins, H. J. Heinz Co. Pty. Ltd., Chairman, Southern Australia Section. Official Opening by Sir Thomas Playford, G.C.M.G., M.P. Opening Address: Dr. R. V. Culver, South Australian Institute of Technology, Adelaide. Presentation of Australian I.F.T. Award. Award Address.

AFTERNOON: SYMPOSIUM: SULPHUR DIOXIDE IN FOODS. "The Use of Sulphur Dioxide in the Dried Tree Fruits Industry", D. McG. McBean, C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W. "The Chemical Reactions of Sulphur Dioxide in Food", D. L. Ingles, C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W. "Sulphur Dioxide in Wines", B. C. Rankine, The Australian Wine Research Institute, Adelaide. Combined Committee Meeting of Northern and Southern Sections.

EVENING: Joint Meeting with R.A.C.I. and F.T.A. Professor Martin Miller, The University of California, Davis, Calif., "Fruit Dehydration in the U.S.A."

WEDNESDAY, MAY 12:

MORNING: Chairman: Dr. K. T. H. Farrer, Kraft Foods Ltd., Melbourne. "Proteins in the Developing Wheat Grain", A. C. Jennings, Waite Agricultural Research Institute, Adelaide. "Studies of Malting Behaviour in Barley", D. H. B. Sparrow, Waite Agricultural Research Institute, Adelaide. "New Ideas on Flavour", D. Forss, C.S.I.R.O., Division of Dairy Research, Highbett, Vic. "The Structure and Corrosion of Tinplate", P. Board, C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W. "Wine in Cans", L. J. Whelan, Containers Ltd.

AFTERNOON: Visit to Sennelands Winery, and Barbecue, or Visit to Waite Agricultural Research Institute, Adelaide.

THURSDAY, MAY 13:

MORNING: Chairman: Mr. A. J. Bardsley, H. J. Heinz Co. Pty. Ltd., Vice-Chairman, Australia Southern Section.

EXPORT SYMPOSIUM: "Food Technology and Export Action", B. M. Sims, Robern Exports Ltd., Adelaide. "Developing Overseas Markets", G. S. Moore, Australian Dairy Produce Board. "Export Regulations", Department of Primary Industry. "Meat Exports", P. Anderson, Metropolitan Wholesale Meat Co., Adelaide.

AFTERNOON: "Tuna in Southern Australian Waters", Dr. G. L. Kesteven, C.S.I.R.O., Department of Fisheries and Oceanography, Cronulla, N.S.W. "Starch-making in Venezuela", Dr. Werner Honsch, Adelaide.

General Meeting to consider the report of the Ad Hoc Committee on the formation of the "Australian Institute of Food Science and Technology".

EVENING: Official Dinner. Guest Seaker: H. Basten, C.M.G., M.A., Vice-Chancellor of the University of Adelaide. "New Bedford Park University".

FRIDAY, MAY 14:

MORNING: Chairman: P. M. Crocker, Chairman, Australia Northern Section. "Food in the Future", Dr. H. Marston, F.R.S., C.S.I.R.O., Division of Biochemistry and Nutrition, Adelaide. "Salmonellosis", Dr. Nancy Atkinson, University of Adelaide. "Notes on Beer Flavour Measurement", N. H. Pope and J. V. Harvey, The South Australian Brewing Co. Ltd., Adelaide. "Milk Powders and Other Milk Proteins Available for Use in Foods", R. A. Buchanan, C.S.I.R.O., Division of Dairy Research, Highbett, Vic.

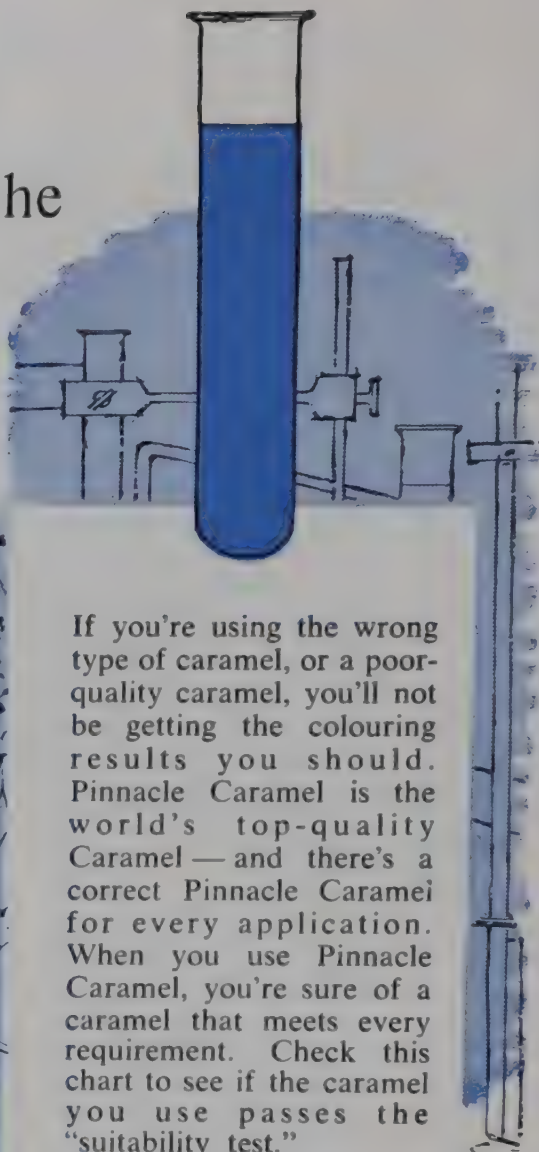
AFTERNOON: Plant Visit to the South Australian Brewing Company.

CREAM TRANS-PACIFIC

Frozen cream is now being exported by a N.Z. co-op. to the U.S. in plastic containers. N.Z. is the only country with an export trade in bulk cream to the U.S.

Blow-moulded plastic containers have resulted in considerable savings in freight costs for the company. The cream is used in the U.S. in the manufacture of soups, ice cream, and other foods.

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Pastrycooks

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Meat Canning,
Pudding and Cake

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TIN-COATED STEEL FOIL

A NEW U.S. STEEL PRODUCT

The "American Metal Market" reported that the U.S. Steel Corporation was now producing commercial quantities of tin-coated steel foil at its Fairless works.

The thickness of the new foil is 0.002 in., less than a quarter of the thickness of traditional tinplate used for cans for fruits and vegetables, which is commonly about 0.009 in. to 0.0096 in. thick. Mr. Sentner, the Executive Vice-President of U.S. Steel gave the following data:—

The weight of 100 sq. ft. of the new tinned steel foil is 12 lb.

It is available in coils weighing from 1,000 to 20,000 pounds, in widths ranging from 24 to 35 in. The cost of 100 sq. ft. in coils ranging in size from 4,000 to 6,000 pounds is \$2.27.

This compares with \$1.74 per 100 sq. ft. for aluminium foil of the same thickness. Aluminium foil of this thickness would be considerably inferior in strength; in order to have comparable physical strength the aluminium foil thickness would require to be 0.0035 in. to 0.004 in.

The main market for the new tinned steel foil is likely to be in packaging, especially as disposable baking pans, dishes, and trays for pies, cakes, etc. However, the fact that this material is solderable makes it an engineering material; for example, it could be used as a soldered spiral cladding for cables, as a substitute for thicker gauges of continuous strip tinplate which are currently used.

No details were given by Mr. Sentner as to the thickness of the tin coating but to suit consumers' needs it can presumably be varied from a few millionths of an inch up

to about 30 millionths, equivalent to just less than 4 ounces of tin per 100 sq. ft. of foil. The new product at 0.002 in. thickness is a useful extension of the idea of thinner tinplate which began with the introduction of double-reduced tinplate (0.006 in.) about four years ago.

From "Tin and its Uses", No. 63 (1964).

THE BEHAVIOUR OF A FOOD POISONING STRAIN OF

Clostridium Welchii IN BEEF

An inoculum of 10^5 spores of *Clostridium welchii* F.2985/50 in meat survived steaming at 100°C for 5 h, the number being reduced seven fold for every hour of steaming. They also survived for at least 6 months in frozen meat stored at -5°C and -20°C, whereas vegetative cells died more rapidly at -5°C than at -20°C. In beef stored for 13 days at 1°, 5° 10° and 15°C there was no multiplication but a slow destruction of vegetative cells, but there was little change in the spore count. Slow multiplication occurred at 20° but at 25° and 37°C growth was rapid. Only about 3 per cent of the spores germinated without prior heat shock, so the majority failed to germinate in raw meat stored at any temperature but did so once the meat had been heated. In meat which had been heated and allowed to cool almost all the spores had lost their heat resistance. Meat with a higher pH than that used in the experiments (5.7-5.8) would probably have a lower minimal growth temperature for these organisms and would thus be more susceptible to spoilage.

"J. Applied Bacteriology", 26, 415 (1963).
E. M. Barnes, J. E. Despaül and M. Ingram.

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The American Meat Inspection Regulations

Agricultural Handbook No. 191 prepared by the Agricultural Research Service of the U.S. Department of Agriculture, generally known as "*The American Regulations*" to many in Australia associated with the meat industry, has provoked considerable discussion and in many cases activity amongst meat packers and processors engaged in the export of meat and meat products.

This handbook is intended for use by meat packing plant operators, architects and engineers, meat inspectors, and others engaged in the slaughter and processing of meat.

It was prepared to make known in simple direct terms equipment and building requirements necessary to satisfy the U.S. Federal Meat Inspection Act which is "*. . . for the purpose of preventing the use in interstate or foreign commerce . . . of meat and meat food products which are unsound, unhealthful, unwholesome, or otherwise unfit for human food . . .*"

Although the export of meat and meat products from Australia to a number of countries has operated under the Meat Export Control Act for many years, the regulations set down now will be rigidly enforced so as to comply with the requirements of the Meat Inspection Division of the U.S. Department of Agriculture.

At present the enforcement of the regulations is aimed primarily at maintaining exports to the American market although advantages could be secured in gaining other overseas markets.

For instance, Sweden and Germany hitherto regarded as excluded to meat imports from many countries because of stringent regulations there relating to hygiene, may find Australian export meat accept-

able under these newly enforced regulations.

All operators find it very expensive to implement the requirements of the regulations particularly in existing plants. But the responsible operators in Australia realize that enforcement of the regulations will gain the Australian meat export industry a higher standing and wider acceptance in many foreign countries as well as the United States. This is because the U.S. regulations now being enforced are generally acceptable in most countries today.

For the present time in respect to meat and meat products prepared for local consumption in Australia it is unnecessary to undergo requirements of regulations such as now apply to export meat. But the authorities and the meat industry, in the interests of the Australian community, may well consider the benefits from such regulations and the implied responsibility lest food products "*which are unsound, unhealthful, unwholesome or otherwise unfit*" find their way onto the Australian market.

An Editorial reprinted from "*Australian Refrigeration, Air Conditioning and Heating*", November, 1964.

MODERN PACKAGING COURSE

By arrangements with the Sydney Technical College and National Packaging Association of Australia (New South Wales Division), a course of instruction on Modern Packaging is being conducted during 1965.

The course is a primer in Modern Packaging and will cover all phases of packaging . . . materials, surface design, and product development; shelf appeal and testing of packages, etc.

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DAMAGED STARCH IN FLOUR AND BAKING QUALITY

By H. J. MOSS,

Bread Research Institute of Australia, North Ryde, N.S.W.

Two-thirds of the constituents of flour are starch. Starch, damaged in the milling process, provides the food in a dough which enzymes and yeast together convert into carbon dioxide gas, but sound starch plays a largely passive role in breadmaking. This newsletter discusses some practical effects in the bakehouse which are attributable to variations in the proportion of damaged starch granules in flour.

Starch occurs naturally as tiny oval granules ranging in size, but of the order of from one to ten millionths of an inch in diameter. The outer layers of some of these become damaged in varying degrees when the wheat is milled into flour. Soft wheat starches suffer less damage, as the mill stocks are more readily reduced to flour, but the more severe shearing action required with hard wheats results in a higher degree of starch damage. Conditioning treatment, mill design, and rate of extraction may also influence the degree of damage to the starch granule.

While sound starch will absorb approximately one-third of its weight of cold water, and is relatively impervious to enzymes, the granules which have been ruptured will take up much more water, and are susceptible to enzyme attack. Because of their higher water absorption, doughs with a high degree of starch damage will finish tighter, or, if they are to finish at normal consistency, will require more water.

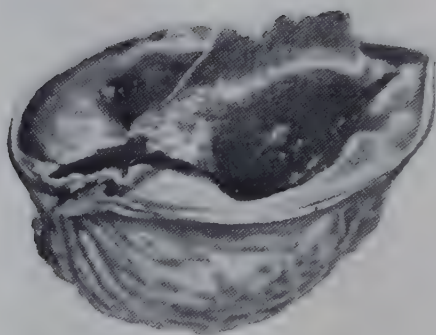
These same doughs, because of the readiness with which the enzymes will convert the starch to

sugars and other products, will *slacken off* during fermentation, as the broken starch cells, by the time the dough is taken, will have ceased to be water absorbing entities and will be present as starch breakdown products dissolved in the dough water. That is to say, damaged starch granules which absorbed water at the mixing stage change during fermentation, releasing water to make the dough slacker. This tendency to *slacken off* is the source of difficulties from time to time in the bakehouse.

Because the enzymes (amylases) in flour attack damaged granules more readily than entire ones, more sugar is produced where the flour contains a high proportion of damaged granules. This sugar production is measured as the maltose figure of the flour. High sugar production in the dough results in a darker crust colour. Victorian flours, which are mainly from soft wheats, are usually low in damaged starch content, have a low maltose figure, and give pale crusts.

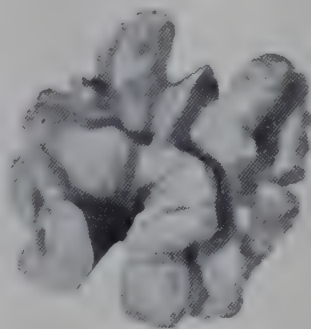
The maltose figure of a flour, as reported in our flour reports, represents the effects both of amylase content, and of the proportion of starch readily available to enzyme attack. In the case of flour milled from sound wheat, which includes virtually all bakers flours, the enzyme or amylase activity is relatively constant, so the maltose figure becomes a measure of starch *damage* only.

In addition to affecting the consistency of the dough and its gass-



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ing power, the distinctive flavour of bread, and the sensation of freshness are due in part to the by-products of enzyme action on damaged starch and to the sugars not used by the yeast.

A maltose figure between 1.8 and 2.5 per cent maltose (per hour) is regarded as most satisfactory. Flours with a figure of less than say 1.5 per cent will tend to produce insufficient sugar, while those with more than 2.7 per cent may tend to slacken so much that either they will be mixed too tight, or they will be too slack when moulded.

Malt flour which is made from sprouted wheat, being rich in enzymes, is added to increase the sugar production in a dough.

Bromated bread improvers used by all bakers are normally made with a malt flour base. This means that the level of bromate, and the malt flour content in a dough cannot be varied independently, except

by using a range of improvers with different bromate content.

Differences in flour quality, dough formula and other factors may require variation in bromate (bread improver) addition. It should be remembered, however, that because of its high enzyme activity malt flour can be a limiting factor and any increase in this regard may result in undue slackening of the dough. Likewise, a reduction in malt addition to a flour requiring this supplementation can have an adverse effect on bread quality. In adding the required bromate addition to a flour therefore, it is preferable to select an improver with a greater or lesser bromate content to give the desired effect at an 0.5 per cent (12 oz per sack) addition, rather than to make large changes with one improver.

Improvers currently available in Australia have bromate contents varying from 0.125 to 0.30 per cent.

PRESENT STATE OF FOOD IRRADIATION

The Army's Natick Radiation Laboratories and the Atomic Energy Commission (A.E.C.) have compiled

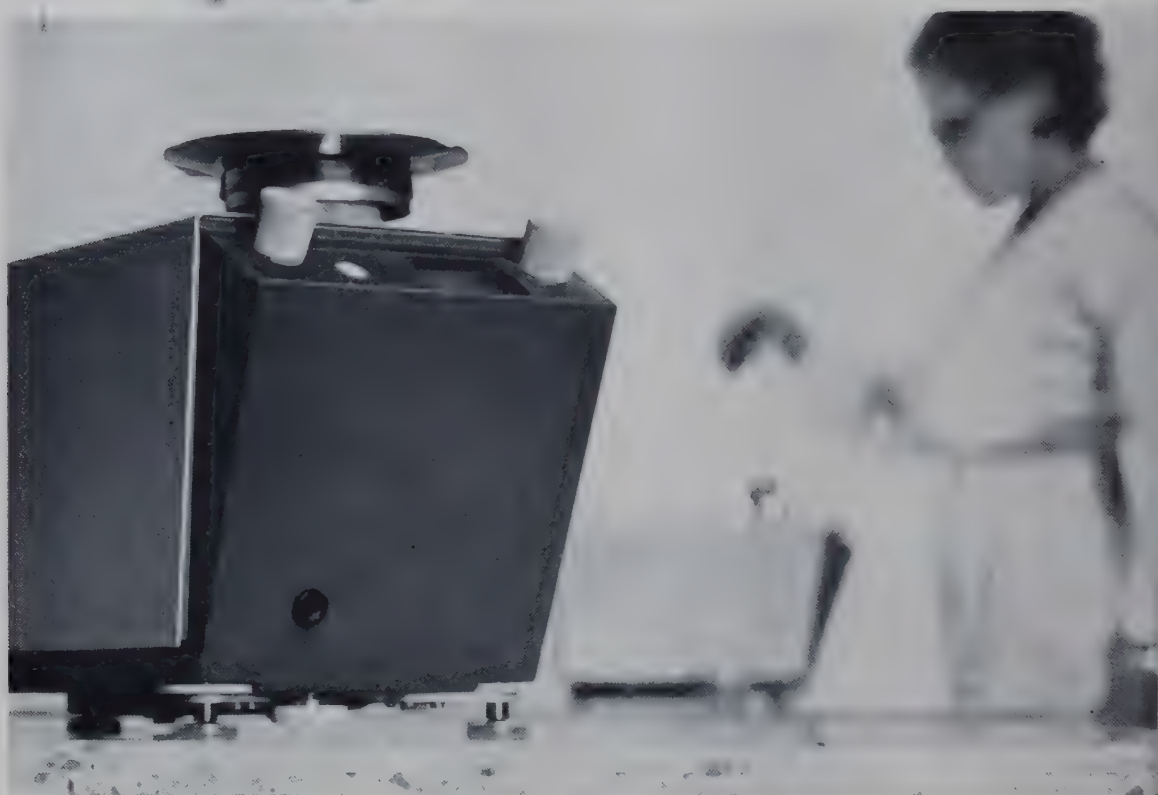
the accompanying table which summarises the current status of the nuclear irradiation of foods.

Food	Developer of process	Status of petitions for F.D.A. approval	Results of tests
Bacon	Army	approved 8 Feb., 1963	keeps 2½ years without refrigeration
Bacon	General Electric	approved 23 Aug., 1963	sterilizes 1 in. package against spoiling
Bacon	Army	pending	sterilizes 2 in. package
Bacon	A.E.C.	approved 1 April, 1964	estimated 2½ year life without refrigeration
Wheat and its products	Univ. of Michigan	approved 21 Aug., 1963	Totally removes infestation that could cause spoilage
White potatoes	Army	approved 8 July, 1963	inhibits sprouting for 12-18 months
Oranges	Army/A.E.C.	pending	doubles refrigerator life of untreated oranges
Chicken	Army	to be submitted, 1965	keeps 2½ years without refrigeration
Ham	Army	to be submitted, 1965	keeps 2½ years without refrigeration
Strawberries	A.E.C.	to be submitted, 1965	reduces spoilage loss
Seafoods	Army/A.E.C.	to be submitted, 1965	assures 30-day shelf life
Pork	Army	to be submitted, 1966	keeps 2½ years without refrigeration
Beef	Army	to be submitted, 1966	keeps 2½ years without refrigeration



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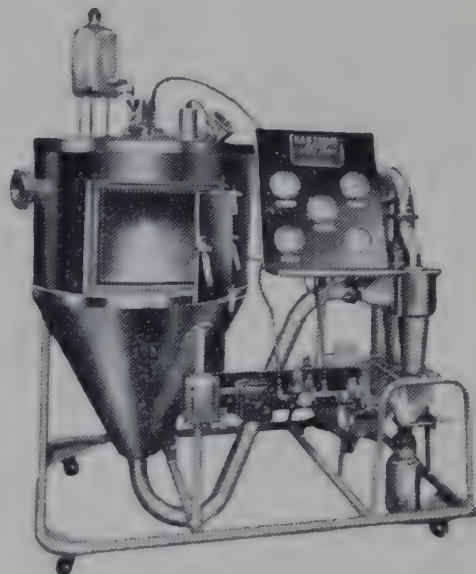
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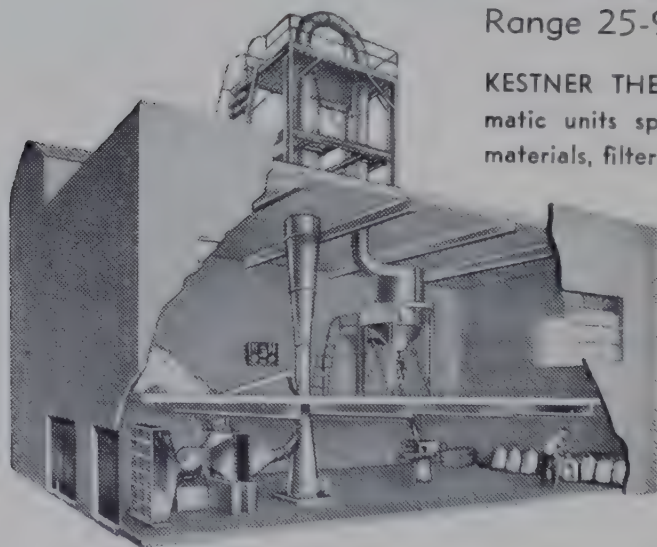
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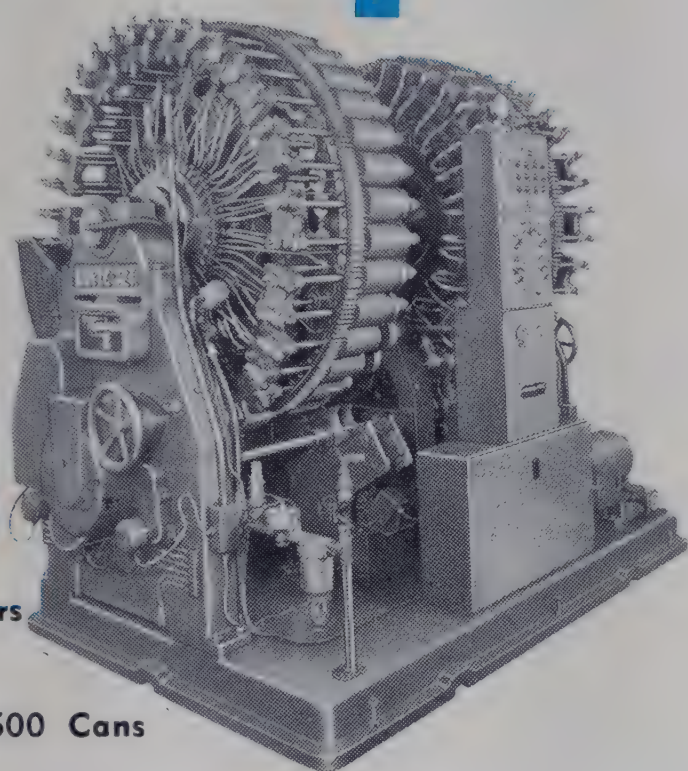
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FOOD TECHNOLOGY

VOL. 17, No. 6
JUNE, 1965



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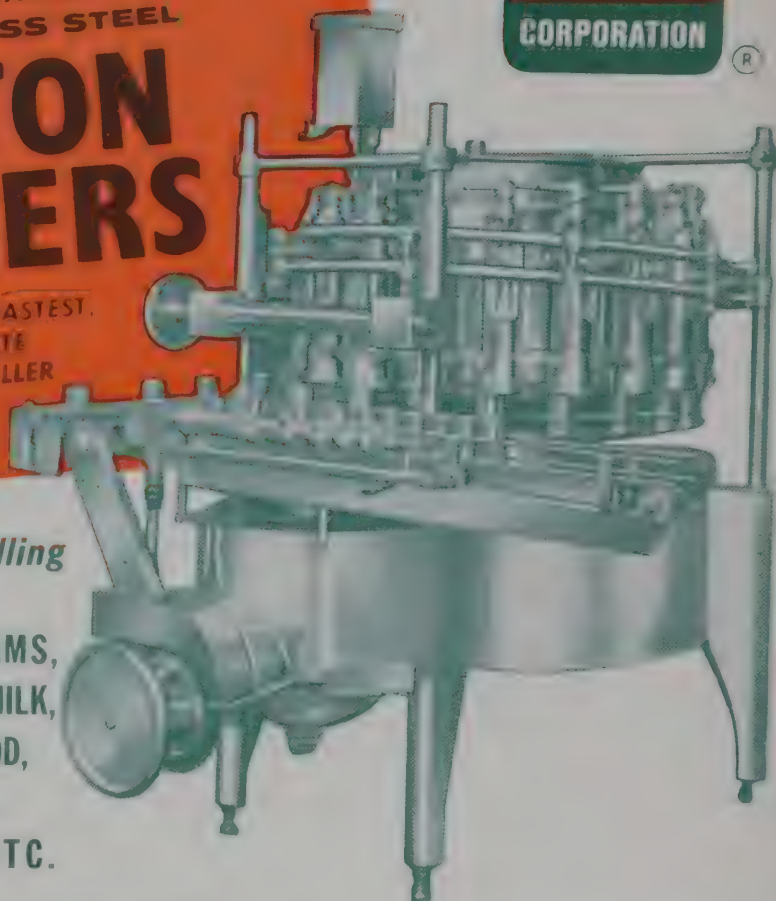
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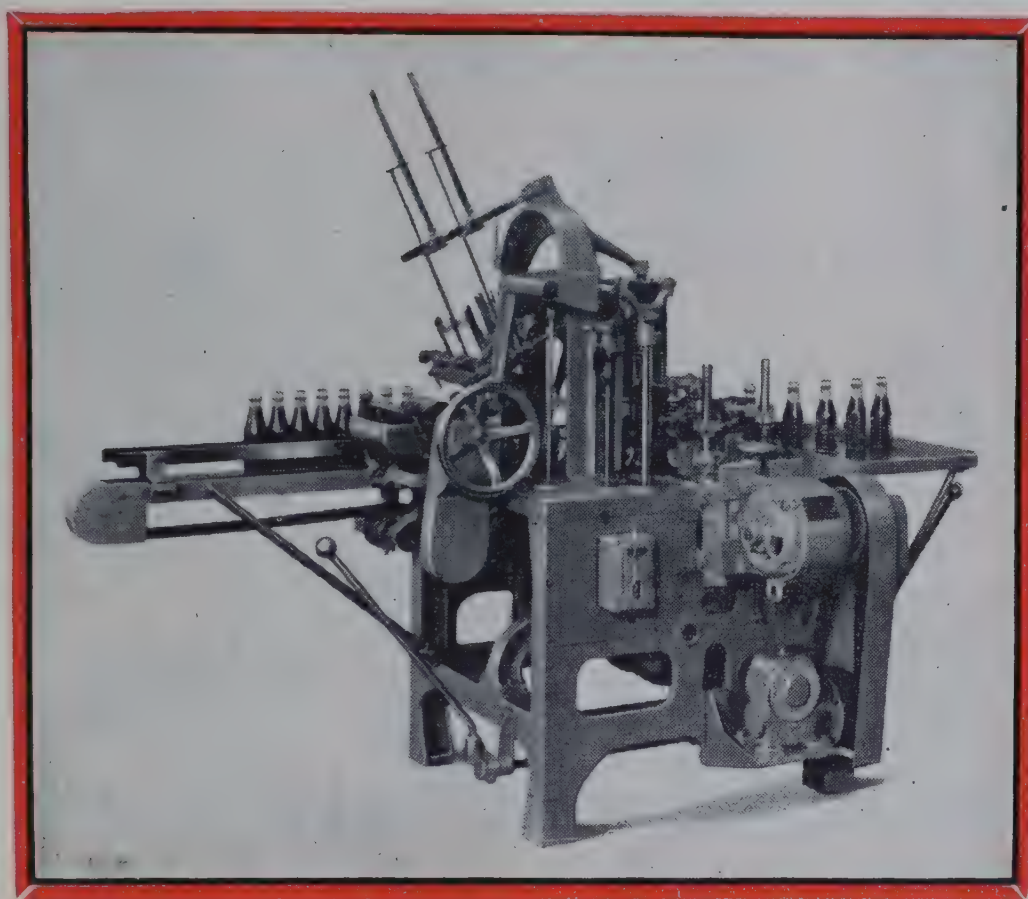
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Editor:

F. H. REUTER, Ph.D., F.R.I.C., F.R.A.C.I.
Associate Professor of Food Technology.
The University of New South Wales.

Business Manager:
S. M. ADAMS.

Office:

12 O'Connell Street, Sydney, N.S.W.
Telephone: 25 5401.

All correspondence to be forwarded to this
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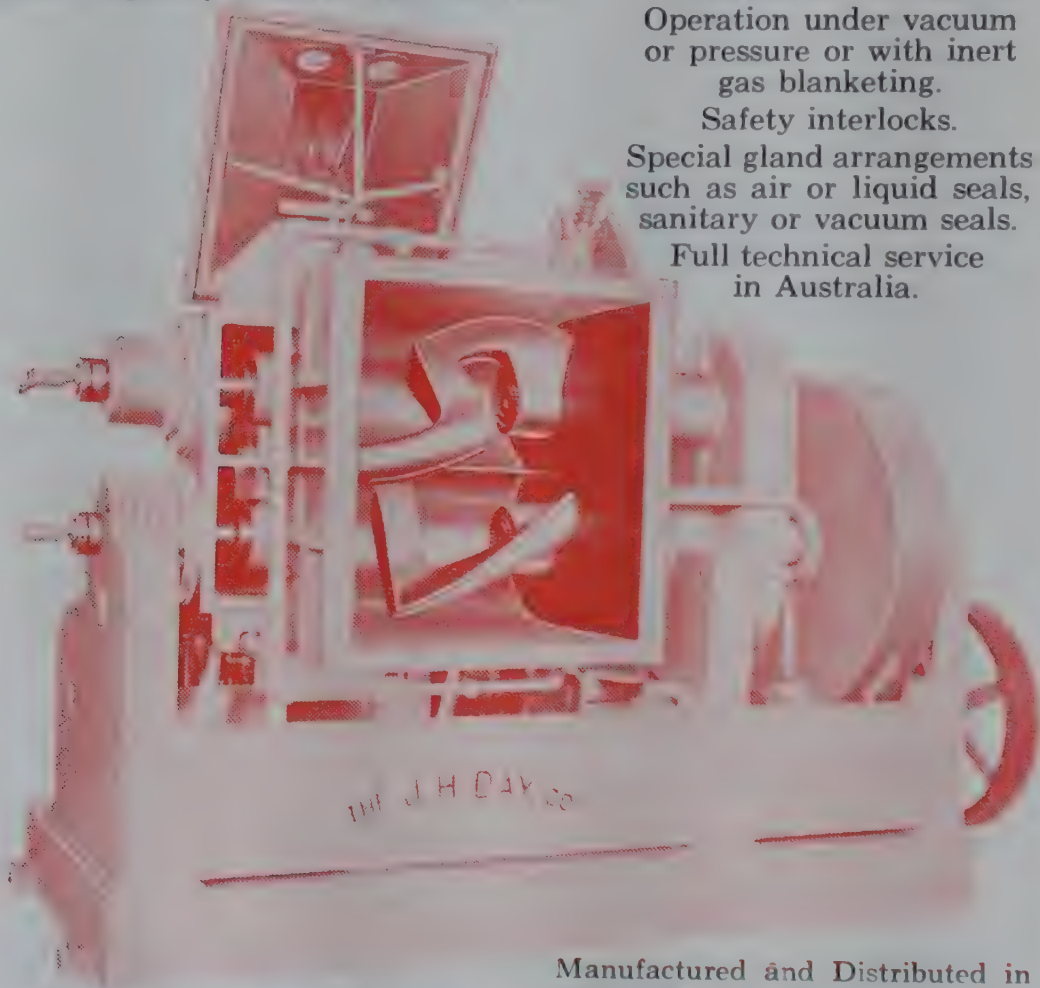
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161/65A

Food Technology Pioneer Retires

It was a fitting tribute to a great Australian food technologist when the 1965 I.F.T. Australian Award was presented to Lawrence Joseph Lynch at the recent Convention of the Combined Australian Sections of the Institute of Food Technologists.

Since then Mr. Lynch has retired from his position as Head of the Canning and Fruit Products Section of the C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W.

Born in New South Wales, Laurie Lynch qualified as a pharmacist at the University of Sydney and subsequently took a first class honours degree in Agricultural Science at the University of Queensland. In 1935 he was appointed Citrus Fruit Research Officer in the newly founded Council of Scientific and Industrial Research and in 1940 became Officer-in-Charge of the Division's Canning Section.

During World War II, Mr. Lynch made notable contributions to the war effort of the Australian canning industry which then experienced a sudden and rapid expansion to supply the needs of the Allied Services in the South Pacific Area. In 1942 he became Technical Adviser to the Commonwealth Controller of Defence Foodstuffs and in that capacity was sent to America to survey the canning industry. The knowledge gained he applied in the technical assistance to Australian canners, especially those engaged in the canning of vegetables for the first time. By methods which were aggressive or persuasive as the occasion demanded he also promoted the commercial canning of citrus juices in Australia.

Since that time he has steadily ministered to the technical needs of the canning industry, by advice, by assistance with its day to day problems, and by research directed to-

wards improving the quality of canned foods.

Mr. Lynch's special field of research has been the chemistry and technology of green peas, especially the definition and prediction of optimal maturity for processing. As a result of these investigations he and his co-workers developed procedures based on the use of the Maturometer which have given a rational basis for the organization of the harvesting of green peas.

The success of this work led to an invitation to demonstrate this technique in the United States and in 1954 Mr. Lynch served for six months as Professor of Vegetable Crops at the New York State Agricultural Experiment Station, Geneva, N.Y.

Mr. Lynch's continuing interest in the technology of green peas more recently led to the development of a novel type of pea sheller which will eliminate the incidence of the troublesome viner off-flavour in processed green peas.

In 1957-58, Mr. Lynch was Visiting Food Technologist and Acting Director of the Food Processing Laboratory in the College of Agriculture, University of Hawaii, a post which he filled with distinction.

Mr. Lynch has been keenly interested in food technology education and was substantially responsible for the establishment of the Food Technology Diploma Course at the Hawkesbury Agricultural College, Richmond, N.S.W. This interest was also displayed in his work with overseas students who visited Australia under the Colombo Plan of Technical Assistance and the United Nations Technical Assistance Scheme and students from twenty

— Continued on page 375

New Uses of Lactose in Food Manufacture

By D. WELCH,

British United Dairies Pty. Ltd., Melbourne

Lactose is a unique food sugar in that it was one of the first utilized in limited applications in food-stuffs and then took a back seat for many years whilst the use of other sugars forged ahead. It is only in recent years that lactose has become recognized as having a wide range of applications in food manufacture, not always as an ingredient in its own right but often to modify the behaviour and sweetening properties of sucrose. We are virtually discussing a new food ingredient.

The use of lactose to modify milk formulae for infant feeding is too widely known to warrant more than a passing reference here except to say that in the countries north of Australia considerable activity is taking place in the field of infant nutrition and it appears that Australia will be required to play a major role in this activity both in the supply of lactose and prepared infant foods.

SOURCE, CHEMICAL COMPOSITION AND PROPERTIES OF LACTOSE

The chief commercial source of lactose is cheese whey and while there exist many different techniques of processing, the basic procedure is the concentration of cheese whey to the point of lactose crystallization, with further refining of the crude lactose in much the same manner as other sugars. An interesting by-product of this process is the mother liquor which is valuable for stockfeeding.

Lactose is known to exist in the form of three modifications; name-

ly the alpha or mono hydrate, the beta anhydride and the alpha anhydride.

The milk sugar of commerce is the alpha or mono hydrate milk sugar, the product which crystallizes from milk sugar solutions at ambient temperature. It contains 5 per cent water of crystallization, which it retains up to 110°C, but between 110°C and 130°C it loses its water of crystallization.

Prolonged heating above 110°C and up to 130°C causes the milk sugar to take on a light brown colour, and decomposition sets in. As the temperature is increased the decomposition progresses and the sugar further darkens in colour. At 170° to 180°C it forms lacto-caramel, which is deep brown in colour and has a peculiar odour. The anhydride melts at 203.5°C.

Lactose has a specific gravity of 1.545 and its specific heat is 0.30. On hydrolysis lactose splits up into glucose and galactose.

Being nonhygroscopic it can serve as an anti-caking agent and dispensing aid in powdered products.

While readily soluble in water, the solubility properties of lactose are somewhat different from those of the other common sugars. For example, at 0°, only 5 g of lactose is soluble in 100 ml of water, but at 25°C, 8.6 g, and at 64°C, 26.2 g can be dissolved in 100 ml of water. Lactose dissolves less rapidly than other sugars. Due to the slow change from the less soluble alpha form to the more soluble beta form, initial solubility is only about 40

per cent of the ultimate solubilities given above. The solubility in concentrated sucrose solutions is only about half its solubility in water alone. These properties make lactose very useful for coating many products, including fats, to improve wetting and dispersing properties of the finished products.

J. V. Reger⁽¹⁾ discusses the relatively low sweetness value of lactose — 16 as compared to 100 for sucrose. He describes its use to reduce the excessive sweetness of some icings and certain pie fillings and to improve the flavour. The claim is made that as a sugar lactose is a *tenderizer*, and considerably higher levels can be used for tenderizing without causing excessive sweetness.

APPLICATIONS OF LACTOSE IN FOODSTUFFS. FLAVOUR ENHANCEMENT

In the field of flavour enhancement lactose is found to absorb and project flavours, and serves as an extender for many spices and volatile aromas.

American instant coffee manufacturers found that if during the evaporation process they passed the gasses through a layer of lactose, it absorbed volatiles. This adsorbate when added to the powdered coffee, improved its flavour.

No investigation has taken place to determine whether lactose has a specificity for certain flavours and aromas. As lactose appears to enhance all flavours there could be a strengthening of off-flavours. It is known that lactose is very effective as a flavour enhancer in products such as barbecue sauces, salad dressings, fruit drinks, pie fillings and puddings. For powdered flavours lactose imparts both flavour enhancement and improved free flowing characteristics. Manufacturers of chipped potato products use lactose as the base for their flavour dusting powders.

PIGMENT ABSORPTION

Lactose has been shown to have pigment absorbing ability and because of its slower solution rate

than other common sugars may give a good colour distribution throughout a mix, *i.e.*, the colour is released slowly and no concentrated colour droplets form. This feature could appeal to manufacturers of coloured puff pastes, food dyestuff users. With coloured icings low sweetening property is important too.

FERMENTATION

The fact that lactose is not fermented by brewer's yeasts is important in the manufacture of milk stout. Anon.⁽³⁾ Lactose is used to make a priming solution preferably at an original gravity of 1110 degrees*, using the basis of 4 oz of lactose per gallon of finished stout. The lactose can be added to the settling back or casks in conjunction with the usual sugar priming and caramel solution.

Alternatively about half the quantity of lactose required for a brew is added to the copper 30 minutes prior to casting or turning out. The remainder of the lactose diluted with boiling water made up into a solution of a specific gravity of 1150 degrees†, declared in the Excise Brewing Book as a miniature brewing, should then be employed as a priming to the cask.

In baking lactose is used both as a tenderizer and to impart golden colours to bread and pie crusts, resulting from the inability of bakers yeast to ferment lactose. Also pie crusts in which butterfat is part of the shortening are known to have a more pronounced butterfat flavour when lactose is used.

CRYSTALLIZATION CONTROL

In the presence of other sugars, lactose alters their behaviour in crystallization, and often is used to control crystallization.

The common method is to seed the sugar with superfine lactose to initiate fine crystallization and thus avoid the coarse crystal growth which causes grittiness or sandiness. Apart from ice cream, con-

*1110 degrees = 26 degrees Brix, 29.9 per cent weight/volume, 22 degrees Twaddle.

†1150 degrees = 34.6 per cent degrees Brix, 41.2 per cent weight/volume, 30 degrees Twaddle.



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densed milk, etc., applications are powdered coffee creams, and confectionery fudges where improved body and texture may result from the use of lactose seeding.

EMULSIFYING

Lactose improves the emulsifying efficiency of shortenings, producing uniform cell structure and rich flavour. This function in emulsification is important to pie manufacturers in that it produces good distribution of the shortening with the minimum of mixing.

Compared with conventional pastries, pastries with 8 per cent lactose (flour basis) are more tender and shorter after both mixing and baking. They sheet out better and shrink less after sheeting and during baking and there is less tendency for the crust to become soggy throughout or in patches. Tolerance to mixing is increased, and changes in dough ingredient temperatures become less important.

In cake manufacture lactose improves the creaming of cake batters, resulting in better volume, grain and texture. Basis is 10 to 15 per cent lactose (sugar replacement basis).

Using lactose, doughnuts and machine cut dough pieces release more readily from the dies and yet maintain their shape better in the baking process. Usage rate is 3 to 4 per cent (flour basis).

When 15 to 20 per cent of the sugar is replaced by lactose, custards and cream fillings of pies are smoother, more tender and richer tasting.

Chocolate manufacturers should find it possible to reduce the cocoa butter content and yet get a more pronounced cocoa butter flavour with a reduced tendency to sugar crystal migration and fat bloom in storage.

S. M. Welsburg (2) in reviewing the uses of lactose cites an Austrian patent in which it was claimed 1 to 3 per cent of lactose in butter materially increased stability and improved flavour. In the same review he mentions patents outlining meth-

ods in which lactose was used to produce caramel colour.

VARIED USES

The nonhygroscopic property of lactose has enabled pharmaceutical manufacturers to simplify tablet production to an amazing degree. They also use lactose in encapsulating with a corresponding reduction of problems. This property of lactose points to an obvious application in machine dispensed powdered products such as full cream milk powder in coffee and tea dispensers, powdered soups, etc.

In the flavour enhancement applications lactose is being used to extend M.S.G. and protein hydrolysates on the basis of 1 to 3 per cent addition to the total mix. Berry preserves are given improved storage life, the use of 15 per cent lactose (sugar displacement basis) retains and highlights the colour in the preserves. An excellent pie glaze or wash can be made using a 25 per cent solution of lactose.

SPECIFICATION

Generally speaking where a food-stuff is subject to extensive heat processing the commercial grade lactose can be used, however B.P. grade lactose should be used for all other applications.

	Typical Analysis	
	Commercial	B.P.
	Lactose	Lactose
Lactose . . .	>97.5%	>99.5%
Moisture . . .	< 0.4%	< 0.1%
Ash	< 0.8%	< 0.1%
Protein	< 1.2%	—
Lactic Acid	<0.15%	—

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The problem facing world food producers over the next decades: A new nation of 63 million people is born every year through population growth.

Food Technology in Europe

(Continued from Vol. 17, No. 5, page 294)

FISH

The chairman for the section on Fish was Dr. C. L. Cutting and three papers were presented:—

BIOLOGICAL ASPECTS, THEIR INFLUENCE ON FUTURE SUPPLIES, by Dr. H. A. Cole, Ministry of Agriculture, Fisheries and Food, Lowestoft.

Fishing in the North East Atlantic is regulated by the Permanent Commission of the 1946 and 1959 Fisheries Conventions. It prescribes minimum sizes of landing of all the more important kinds of fish and minimum sizes of the mesh of trawl nets which can be used. Provision is also made for controlling at 10 per cent the proportion of undersized food fish which might be taken incidentally without penalty.

The principal method of regulation is by control of the mesh size of the nets and stock assessments which requires an elaborate system of sampling of catches at the ports and at sea.

There are many kinds of fish living together in the North Sea, fished by the same vessels at different seasons and a single mesh size cannot be devised which would be appropriate for all kinds of fish. The minimum mesh is at the moment 75 mm for most gears, but this should undoubtedly be increased to 90 or 100 mm for cod and plaice and not much less for haddock. Evasion of net regulations is frequent and agreement on some measure of international inspection at sea is the most urgent problem facing the Permanent Commission.

While regulations, can maximize the yield from the separate fish stocks, these are affected by variations in recruitment from year to

year due to differences in the survival of the successive annual broods of young fish. Losses during the first few months of free swimming life are more important than losses during later life.

In the future, the steady improvement in the methods of population analysis and fish stock assessment, combined with more accurate statistics, will enable prediction with greater certainty of the effects of changes in mesh regulation and fishing practice.

Very substantial changes in fishing grounds and in the make-up of landings have occurred in recent years in Europe, *e.g.* redfish have assumed greater importance in certain countries.

As fishing pressure on the Arctic grounds around the Norwegian coast and in the Barents Sea has increased, there has been a steady shift to Iceland and Greenland. The grounds of Southern Labrador and Newfoundland have been increasingly exploited in recent years by ships of several European nations.

Looking to new grounds still further afield, there are rich stocks of hake and other cool water species on the Continental shelf off the south of Africa and South America. On the Patagonian Shelf a new venture by Spanish vessels reports very heavy catches; here the shelf is very wide and under the influence of the cold Falkland Current, supports an enormous assemblage of fish species.

Turning to the possibilities of boosting the stocks of fish in heavily exploited areas, the methods which have been discussed, and in some cases tried on a tentative scale, include artificial rearing of young fish in hatcheries. These

young fish might then be liberated directly on to chosen nursery grounds or they might be confined in semi-enclosed areas such as sea lochs or fjords, or they might even be reared to saleable size in hatcheries or tanks without reaching the sea at all.

FISH TECHNOLOGY IN BRITAIN, by Dr. G. H. O. Burgess, D.S.I.R., Humber Laboratory, Hull.

The economic situation of the British fish industry, has, for the last few years, been somewhat unhealthy. The reasons for this are complex, but briefly it may be said that declining yields on many fishing grounds and extension of fishing limits, have greatly contributed to increased costs of production.

The knowledge that yields were declining on the prolific distant-water grounds, that vessels were therefore likely to remain longer at sea and that some of the catch from distant water grounds was no longer fresh at landing, led to work at Torry on the problems of freezing the whole or part of the catch at sea.

For a number of reasons the industry is now favouring a full freezer trawler capable of handling and freezing the total catch in blocks on any one day.

Another proposal for the freezing of fish at sea has been developed. These are factory trawlers carrying, in addition to the normal fishing crew, a factory staff who fillet the catch and freeze it in conventional horizontal plate freezers in 7 lb packs.

A third possible way of freezing at sea, that has been discussed is by using a number of trawlers and transferring the catches to a mother ship.

Some of the problems on freezing now being encountered for the first time arise largely through the fish being so recently alive. Discolouration of fillets cut from sea-frozen fish may be due to the presence of

blood pigments frozen into the muscle. On a freezer trawler, when fishing is light, much of the catch may enter the freezers in a pre-rigor condition. Rigor becomes of importance on the factory trawler where the fish is filleted before freezing. Fillets cut from pre-rigor fish and which then enter rigor before freezing are unacceptable for any purpose. They shrink and become rough, wrinkled and rubbery.

The introduction of this relatively new technique to solve some of the problems of distant-water fishing, has brought with it new problems the solution of which will largely depend on a deeper insight into the biochemistry of fish muscle.

By far the largest bulk of British fish is, however, still landed and distributed in the *wet* form, either as fillets or whole fish. Since *wet* fish is the raw material for all other processes, work on its spoilage is of fundamental importance. The spoilage of wet fish is brought about mainly as a result of enzymic and bacterial activity and at the sites of bruising, more rapid spoilage occurs.

The desirability or otherwise of using antibiotics on fish seems to be largely a question of whether the industry would find it worthwhile to use them for the additional two to four days *life* which is likely to be obtained. It may well be profitable to extend the length of trip by one or two days, since this could increase the rate of fishing to steaming time, but it may also be that in so doing fish of lower *average* quality will be landed, since antibiotics do not appear to have any effect upon quality until the fish has been stored in the ice for 12-14 days.

Forms of *convenience* packs are being studied. For example, wet fish sealed under vacuum in gas-impermeable pouches has better keeping properties at 0°C than wet fish stored according to best standard practice, but many problems still remain to be solved.

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LIQUOR LOSS AS AN INDEX TO FISH TEXTURE, by Drs. W. T. Little and R. H. Smithies, Unilever Research Laboratory, Aberdeen.

For fish held in ice during storage, the most important indices of quality are odour and flavour, and spoilage may be assessed by bacterial count and by chemical tests. The spoilage of frozen fish is not necessarily accompanied by deterioration in odour or even in flavour; thus, sea-frozen fillets may sometimes possess ideal odour and flavour yet have an unacceptable tough texture.

The deterioration of frozen fish is usually revealed by one or more of the following signs: (i) loss of bloom on the surface of the raw and cooked fillets, (ii) excessive drip during thawing, (iii) toughness of the cooked fish, and (iv) discolouration, particularly in fish filleted and frozen before rigor-mortis.

The first three characteristics are generally attributed to disturbance in the properties of the proteins, affecting the water-binding ability in the system. Progressive spoilage during long-term cold storage has been followed by measuring the decrease in the saline-soluble protein fraction.

This new approach to the quality assessment of frozen fish is based on two points. Firstly, drip is of direct financial concern to fish processors handling frozen fish. The quality of commercially available frozen block fillets, judged by drip loss and taste panels varies greatly and the laboratory tests established on unfrozen whole fish, are inappropriate. Secondly, the increasing sale of fish in consumer packs means that the point at which fish is judged is shifting from the fishmongers' slab to the eating table. The flavour and texture of the cooked product are more important indices of quality than the smell and appearance of the raw material.

The amount of the liquor loss has been shown to be related to the organoleptic qualities of the fish after normal cooking. It was not

possible, however, to correlate a mean liquor loss to a particular time in ice, or in cold store, because of the variable textures within and between batches of fish. For very fresh fish the time of filleting markedly affected the liquor loss. Pre-rigor samples passed rapidly into rigor during the heating periods and there was little or no liquor expelled. The liquor loss percentage increased throughout the onset, duration and resolution of rigor. The most attractive texture is associated with a total liquor loss of between 20 and 25 per cent but if the test is to be applied at a point within the processing chain then the acceptability limits must be defined to suit the processing steps following the test.

DISCUSSION

Dr. Shewan, opening the discussion, pointed to the tremendous changes taking place in all sections of the fishing industry. The speakers had referred to the problems of over fishing and international agreement for the conservation of stocks, the advent of freezing at sea with the attendant problems of the effect of rigor on quality and a new approach to quality assessments. The idea of boosting stocks in heavily exploited areas and of marine fish farming opened up new possibilities. The exploitation of new species was also desirable and in Canada the Home Economics Department in collaboration with the Fisheries Inspection Department did valuable propaganda work along these lines.

Mr. McLachlan asked *Dr. Cole* why so high a proportion of the world's total fish are caught in European waters, and also to say something about the effects of sewage discharge and oil pollution on the supply of fish. *Dr. Cole* replied that the great trawl fisheries are confined to the comparatively shallow waters (often 100 fathoms or less in depth) of the Continental Shelves. They are very extensive off Northern Europe and the Atlantic Coast of North America. In these areas of high population density

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and advanced standards of living large fisheries have developed. There are, however, extensive shallow water shelf areas in other places, but they have not yet been much exploited. In the deep oceans the important edible fish stocks are pelagic species, such as tuna, bonito, and swordfish. Tuna are being actively exploited, principally by Japan and U.S.A., and the resources are very considerable. With regard to sewage, on balance it was harmful. From the point of view of shellfish and estuarine fisheries the effects of sewage and industrial effluents have been very harmful.

Mr. Harms asked Dr. Cole if, in connection with the conservation of fish stocks, he would elaborate on the position of herring, supplies of which were giving some concern to this country and possibly to some countries in Europe. Dr. Cole pointed out that the herring fisheries were left virtually unregulated by the 1946 Fisheries Convention. There is special difficulty in dealing with herring, particularly the herring of the North Sea. There are several separate stocks or races which exist in distinct populations on the spawning grounds but which mix together in the Central North Sea during their earlier years. Such separate stocks exist in almost all commercial species of fish. These stocks have different biological characteristics, for example, growth rate. In order to make reliable stock assessments we must be able to separate the fish of these populations and to assign to each the correct amount of fishing effort.

Mr. J. E. M. Moxley asked if Dr. Little had made any comparison of his liquor loss test with Dr. Love's turbidity test for denaturation of frozen fish? Dr. Little in reply said Dr. Love's test did not apply to fresh fish. The turbidity test for denatured frozen fish agreed well with the results obtained from the test here described.

Dr. Cole questioned Dr. Burgess as to why we cannot freeze hake. Is this due to the milkiness caused by

a parasitic protozoan infestation which occurs in the waters off Morocco? Dr. Burgess thought that hake, provided it was in good condition initially, could be satisfactorily frozen.

Dr. Shewan commented that he had found during the war that imported South American hake were reasonably good in quality. The protozoan infection of hake (which causes the milkiness) caught off the West African coast, can of course be extremely serious and in observations made in 1952 it was established that it could be as high as 40 per cent of the catch.

Mr. A. F. Southcott asked Dr. Burgess to comment on the value of canning as a means of fish preservation. Dr. Burgess said that canning is certainly a valuable method of preservation, the potential of which is perhaps not fully developed here. The Fleck Report recommended that research should be carried out into white fish canning. Amplifying a number of points associated with their liquor loss test Drs Little and Smithies mentioned that to obtain good duplicates it was necessary to carry out the tests at around 40°C. This cooked the fish without denaturing the protein as there was a lack of reproducibility if higher temperatures were used. They always took a middle portion of the fish for their tests as the tops and tails did show some lack of reproducibility.

— To be continued

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PRODUCTION OF DARK COLOURED SULTANAS BY SUN-DRYING IN AUSTRALIA

By G. H. KERRIDGE and M. GRNCAREVIC,
C.S.I.R.O. Horticultural Research Station, Merbein, Vic.

Dark coloured, undipped sultanas were produced by sun-drying on the ground. They had a pleasant malty flavour and a bluish-brown colour with the natural bloom intact. Early in the drying seasons, the fruit dried in 14 to 19 days, but supplementary dehydration was necessary for late season fruit. Dipped sultanas dried in 9 to 16 days and gave a light golden-yellow product.

In Australia sultanas are dipped in an oil-potash emulsion before drying to shorten the drying time. The final product has an attractive golden-yellow colour.

Sultanas, when dried without dipping, give a dark-brown product with a different taste. Both types of dried sultanas have their place on world markets; light coloured fruit is produced in Australia, Greece, Turkey and Iran; dark coloured fruit in California⁽⁴⁾, Iran⁽²⁾ and Afghanistan⁽¹⁾.

In the early days of the dried fruit industry undipped sultanas were produced in Australia, but this practice was abandoned because of uncertain weather conditions. Nowadays dehydration facilities are available and the risks caused by wet weather can be overcome. Therefore a limited production of undipped sultanas could be considered to achieve a greater flexibility on the different world markets.

EXPERIMENTAL DETAILS

Experiments were conducted at the Horticultural Research Section, Merbein, Victoria (Murray Valley),

in the 1963 and 1964 seasons. Drying was carried out on: *sisalkraft* — paper trays, 2 ft x 3 ft, on the ground; wire netting trays, 2 ft x 3 ft, elevated 3 in. off the ground; Australian standard rack⁽³⁾; polythene coated *sisalkraft* trays, 2 ft x 3 ft; black polythene sheet andessian.

Trays were placed between the vine rows. Supplementary dehydration was carried out in an experimental tunnel dehydrator. The dipping emulsion consisted of 2.5 per cent potassium carbonate and 2 per cent commercial dipping oil emulsified in water. Immersion time was 3 minutes at ambient temperature. The drying was considered finished when the moisture content of the grapes was reduced to about 13.5 per cent.

RESULTS AND DISCUSSION

The results of the experiments are presented in Tables No. 1 and No. 2.

Table No. 1 shows the effect of dipping on drying times and colour of dipped and undipped sultanas when dried under identical conditions early in the season (18.2.63). The dipping treatment hastened the

drying, but the difference in drying times was much smaller when the fruit was placed directly on the ground, than when fruit was dried on standard racks. This was probably caused by the higher temperature of the ground and the partial shading of the fruit on the rack.

The colour of the undipped sultanas was bluish-brown after drying and that of the dipper fruit various shades of yellow. The colour development of sultanas depends on the speed of drying, dark colour being caused by the activity of the enzyme polyphenol oxidase which is inactivated in dipped fruit⁽⁵⁾.

Sultanas harvested late in the season (18.3.63) failed to dry without the help of dehydration. Frequent wetting by rain caused moulding of the undipped fruit and gave

a black colour. Late harvesting has no practical possibilities for the production of undipped, sun-dried sultanas in Australia.

Table No. 2 shows the results of the experiments in 1964 carried out at weekly intervals. The drying times of undipped sultanas, when dried on the ground between rows, were compared with those of dipped sultanas dried on the racks. In the first week of the harvest season, the difference in drying time was 9 days in favour of the dipped fruit. After several weeks, this difference decreased to 2 days only. Later in the season, undipped fruit again dried more slowly. At the end of the harvesting period, dehydration was necessary for both dipped and undipped fruit.

TABLE 1
Drying of Sultanas — 1963

Drying Conditions	Drying time					
	Undipped			Dipped		
	In the Sun (Days)	In Dehydrator (Hours)	Colour	In the Sun (Days)	In Dehydrator (Hours)	Colour
Sisal trays on ground	14		Bluish Brown	9		Reddish Golden
Wire trays on ground	16		Bluish Brown	9		Reddish Yellow
Standard drying rack	31		Bluish Brown	9		Greenish Yellow
Wire trays and dehydration	14	5	Bluish Brown	4	5	Reddish Golden
Drying rack and dehydration	16	13	Light Brown	8	5	Dull Golden
Dehydration from fresh fruit stage	—	29	Dull Brown			

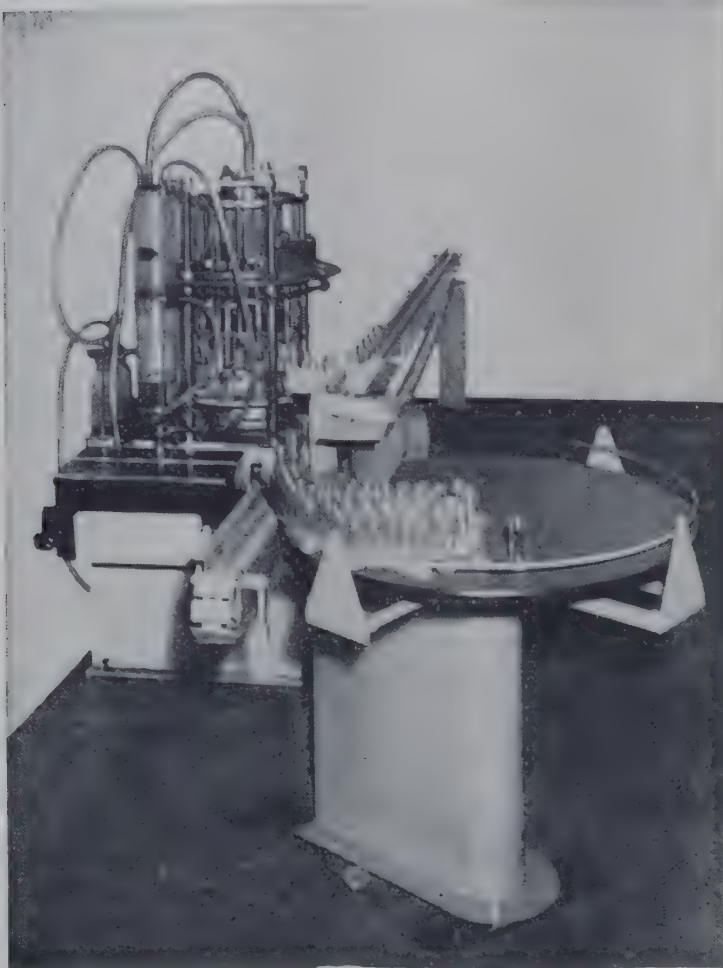
TABLE 2
Drying Times and Climatic Data (1964 Season)

Date of harvest (1964)	Climate during week following harvest		Drying time			
	Average Max. temp.	Rainfall in.	Undipped dried on ground		Dipped dried on rack	
			In the Sun (Days)	In Dehydrator (Hours)	In the Sun (Days)	In Dehydrator (Hours)
12.2	84.0°F	—	19	—	10	—
19.2	81.4°F	—	19	—	14	—
26.2	82.3°F	0.07	17	—	15	—
4.3	83.1°F	0.06	16	—	14	—
11.3	87.5°F	—	18	—	12	—
18.3	87.6°F	—	+	9	16	—
25.3	83.6°F	—	+	11	+	12
1.4	84.5°F	—	+	17	+	12
8.4	70.1°F	0.40	+	31	+	13
15.4	73.0°F	—	+	34	+	17

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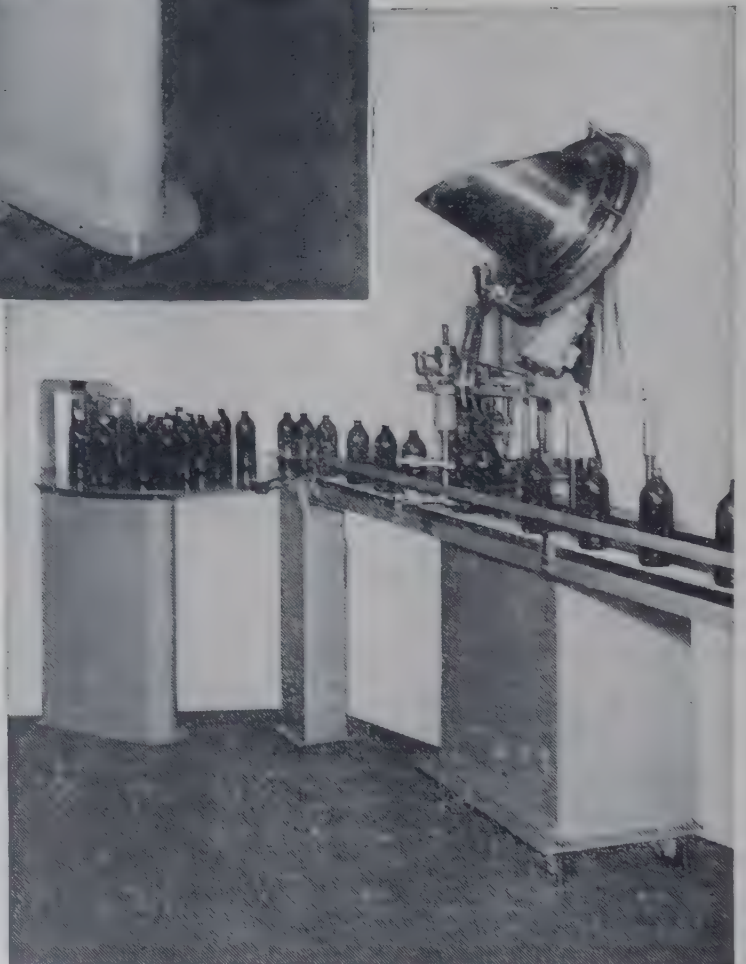
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CONCLUSION

The experiments show that, under weather conditions prevailing during 1963 and 1964 seasons, it was possible to produce undipped sultanas of good quality and similar in appearance to the products of other countries. Grapes harvested early in the season dried without use of supplementary dehydration.

Undipped sultanas have a pleasant, malty flavour, with the bloom intact. The colour of the final product ranged from dark-bluish to light-brown. It seems that at least a portion of the Australian dried sultana crop could be dried undipped, if marketing makes it worthwhile to do so.

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UNIVERSITY NEWS

At a ceremony on 29th April, 1965, The University of New South Wales awarded the following degrees to candidates from the Department of Food Technology:—

MASTER OF SCIENCE (M.Sc.)

Sucharita Ghosh, B.Sc. (Rangoon). Thesis: "Spray drying of bananas". "Spray drying of bananas".

John Ingram Pitt, B.Sc. Thesis: "Microbiological problems in prune preservation".

BACHELOR OF SCIENCE (B.Sc.)

Kenneth Alan Buckle (Honours Class I and University Medal); John Schwab (Honours Class II); Claus Jehne (Honours Class III); Elizabeth Joy Crouch.

SODIUM AND POTASSIUM CONTENT OF FOODS

Some time ago the I.F.T. Australia Northern Section Executive set up a committee on *Sodium and Potassium Content of Foods* to collect information that had been requested by the Australian Dietetic Council.

A questionnaire was sent to all Australian I.F.T. members, and through the good offices of State Food Technology Associations to all members of F.T.A's. Much useful information was collected from companies which had information about the sodium-potassium content of their products.

The committee was about to proceed to the next stage of collecting the actual data when it was learned that the Nutrition Division of the Commonwealth Department of Health were proposing to revise the *Tables of Composition of Australian Foods*, and that the revised tables would include information on the sodium and potassium content of foods.

It appeared to the committee that the sensible thing to do was to co-ordinate its efforts with those of the Department of Health. Accordingly the information in the hands of the Committee was passed on to Miss Margaret Corden, Senior Nutritionist, who has undertaken the revision of the food tables.

Miss Corden will shortly distribute to the food industry record cards which they will be asked to complete setting out current information about the composition of their products.

The Committee has urged all I.F.T. members to encourage their organizations to co-operate fully in this project. By this means they will earn the goodwill of dietitians and the medical profession, and will assist to build up a set of comprehensive food tables which will be of immense value to the food industry itself.



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Dietary Factors Affecting Vitamin Requirements

By J. A. CAMPBELL,

Although it is necessary to consider nutrients independently in order to identify their significance and to determine quantitative needs, this approach has tended to over-shadow the obvious fact that individual nutrients are not consumed in isolation, but as part of a diet providing a large number of variable components.

Since vitamins are directly involved in the metabolism of nutrients it is to be expected that requirements are influenced by many factors, one of which is the content or proportion of other nutrients in the diet. The selection of interrelationships discussed in this paper is based primarily on recent work on some of these factors that have been of most interest to the Division of Food Technology and Nutrition, American University of Beirut, and which illustrate some of the problems involved in assessing requirements.

PROTEIN

Protein and their constituent amino acids have many effects on the metabolism of different vitamins. When diets are marginal in protein the amino acid imbalance caused by a relative excess of leucine may lead to depletion of nicotinic acid in the tissues. Millet eating Indians are more prone to pellagra than those consuming rice, for although the content of nicotinic acid in these two cereals is similar millet has more leucine than rice. Tryptophan can substitute for nicotinic acid in man and animals.

Protein depletion seems to interfere with the absorption and utilization of carotene, and to retard the

utilization of liver reserves of vitamin A. Its effect on absorption of vitamin A is not clear. This problem is of considerable practical importance in areas where both protein and vitamin A are limiting.

Riboflavine requirements are also dependent upon the protein content of a diet. With low protein intakes excretion of relatively large amounts of riboflavine have been noted, indicating some difficulty in the establishment of riboflavin retention.

FATS

Fat exerts an effect on the requirement of both water soluble and fat soluble vitamins. During the last few years there has been great emphasis on the effect of unsaturated fatty acids on hypercholesterolaemia and related conditions. There has been much less emphasis on the effects of these fats on vitamin E metabolism.

Vitamin E requirement in man can vary from 5 mg to more than 30 mg daily. Factors that must be considered in evaluating tocopherol needs are (a) the polyunsaturated fatty acid and essential fatty acid contents of the diet; (b) the com-

Summary of a contribution to a Symposium on the Interrelationships of Nutrients reported in "Food and Nutrition Notes and Reviews", April, 1965.



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position of lipids in the body; (c) the specific pattern of fatty acid distribution in the organ or tissue; (d) time as it relates to the consumption of a specific diet and (e) the effect of other metabolic stresses which may alter the need for antioxidant protection.

"Available data may be interpreted as indicating that excess of linoleic acid in the tissues could be undesirable because of the large amount of tocopherol needed to prevent lipid peroxidation. Such data demonstrate the possible far reaching effects of relatively simple dietary modifications, and the need for critical evaluation of such modifications."

SORBITOL

It has been demonstrated that d-sorbitol can enhance the absorption of orally administered vitamin B₁₂ in man and animals and that it can also replace, to some extent, thiamine and vitamin B₆. The data as a whole, however, demonstrate that results may vary markedly, depending on experimental conditions.

MINERALS

Amongst the examples of the influence of minerals upon vitamin requirements cited were the interrelationships between vitamin E and selenium, the effect of magnesium in protecting pyridoxine depleted rats against urinary calculi composed largely of calcium oxalate, and the possibility that calcium oxalate renal calculi can develop in some individuals whose intakes of calcium are high.

It has been suggested also that artificial maintenance of high levels of tissue iron permit increased haematopoiesis with resulting loss of vitamin B₁₂ from serum and liver. *"The data suggest that high levels of nutrients may not be best under all circumstances."*

VITAMINS

A deficiency of one vitamin may impair the absorption or utilization,

or both, of another. Examples cited are (a) deficiency or excess of vitamin B₆ result in lowered serum and liver levels of vitamin B₁₂, even when the latter vitamin is given in ample quantities; (b) folic acid deficiency increased the absorption of vitamin B₁₂; (c) excess riboflavine given to animals deficient in other vitamins of the B complex, depressed gain and food conversion efficiency and increased mortality.

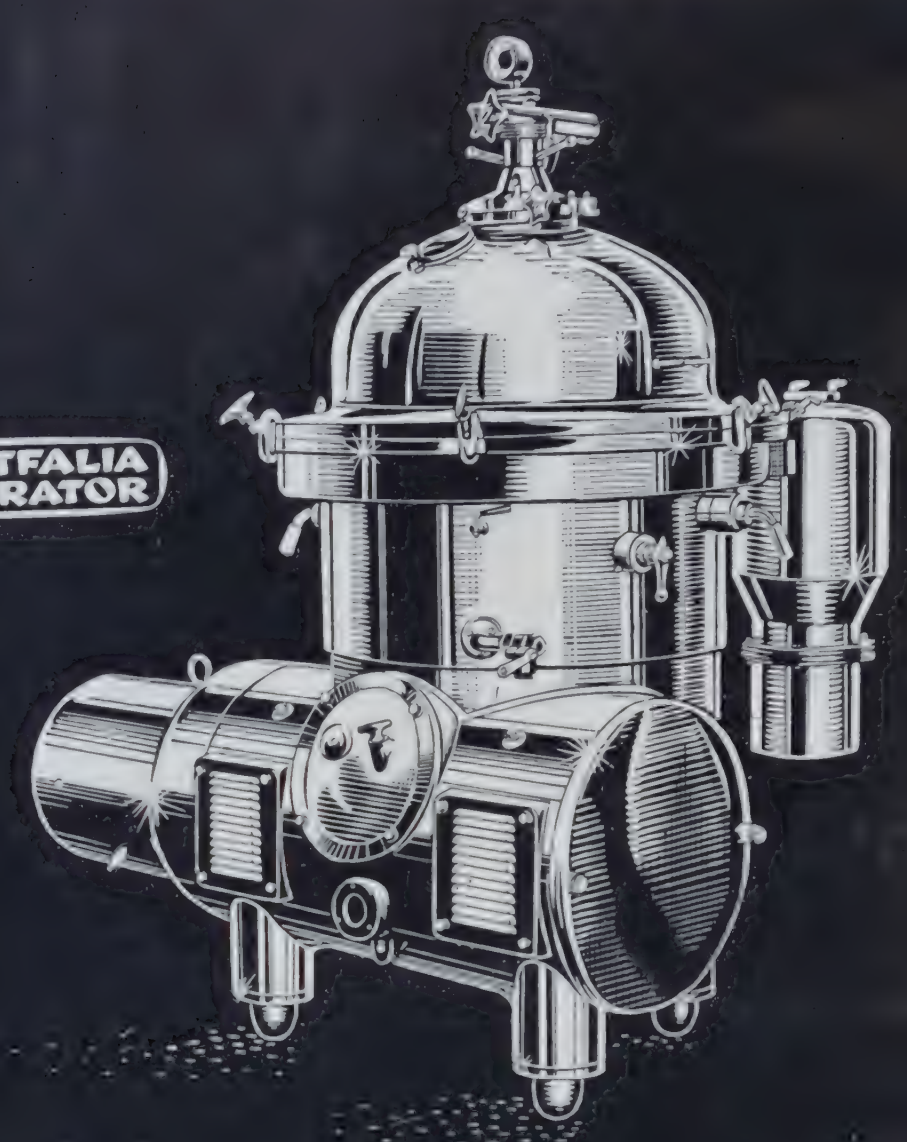
SUMMARY

It appears that vitamin requirements are not absolute in nature, but are subject to considerable variation depending on the amounts of other nutrients present in the diet. Under conditions of an adequate intake of a *normal* diet, the factors described are probably not of great importance. When the diet is borderline in nutrient content, or has been modified to a significant extent, requirements may vary markedly. Excessive intakes of individual nutrients may then be almost as important as low intakes in influencing requirements for vitamins. *"Evidence is accumulating that so-called optimum intakes of nutrients are not maximum intakes, but as Hegsted states 'are somewhere in between too little and too much'."*

BETTER EGGS FROM OLDER HENS

As hens get older, their eggs become more valuable for processing into liquid, dried, and frozen products. Since most commercial egg producers already house their flocks in separate age groups, U.S.D.A. says they could easily pack eggs in age-group lots.

During the first laying year, the value of U.S. eggs for processed products rises by \$2 per case of 30 dozen. Two-thirds of the increase can be attributed to the normal increase in egg size. The rest, however, comes because the eggs from older hens have proportionately less shell, more yolk, and more solids in the yolks.



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FOOD LABELS

By Dr. MAGNUS PYKE,

Distillers Co. Ltd., Menstrie, Clackmannanshire

On September 10, 1964, the [British] Food Standards Committee appointed to advise the Secretary of State for Scotland and the Ministers of Health and of Agriculture, Fisheries and Food issued their report on food-labelling. Four of the ten members of the Committee were Fellows of the Institute.

Two main reasons make this report timely. Firstly, the idea started in the last century at a small grocery in Glasgow, by Mr. Thomas Lipton, of selling a uniform brand of tea, packaged, weighed and labelled, has now become general practice. All sorts of foods, from pork chops to *instant apple flakes*, are marketed today as branded pre-packed articles. It is, therefore, difficult for a housewife to know what she is getting when she takes a superficially attractive item off the supermarket shelf unless the description printed on the wrapper is quite explicit. The second modern trend that makes it important for new and clear descriptions of food composition to be worked out is the rapid advance in food chemistry. Sophisticated emulsifiers, stabilizing agents, colours, flavours, *improvers* and *additives* of various kinds are continually being developed. At the same time, the deepening understanding of food chemistry on the one hand, and of physiology and biochemistry on the other, makes it more and more difficult for either the food technologist or the pharmacologist to be absolutely sure that chemical compounds present in foodstuffs will be entirely inert when they are consumed. It is, therefore, only reasonable for the customer to be told what he is eating.

The proposals of the committee are not particularly new, although

they are always sensible. Pre-packed foods must be labelled with their common names, although if they have been known for 50 years by an invented title the shop can continue to call them by this name. Simple though this proposal may seem, it is in fact not without its difficulties. Appendix C, for example, gives a list of names by which fish may be labelled and sold retail. Among these are such esoteric kinds as *flake*, *forkbeard*, *lance*, *thickback* and *scud*. *Ormer*, *tusk* and *argentine* may also legally illuminate the fishmonger's slab, to inform such shoppers as may ever have heard of them. For compounded articles, all the ingredients must be listed, although bread and flour, coffee, cream, curry powder, saccharine and suet are for various reasons exempt from this requirement. Additives, such as emulsifiers and solvents or preservatives and colouring agents, are classed as ingredients and must be disclosed, either by their names or, for certain ones, under some general term, *e.g. permitted emulsifier*. It is interesting to note from this recommendation how British opinion has progressed. Once, it used to be argued that a list of additives on a package of, say, kipper snacks or custard powder would distract a shopper; now the customers may ignore the information if they wish, but it is there for them if they want to read it.

In the United States, the authorities have got themselves into difficulties, both analytical and philosophical, by demanding *zero tolerance* for certain additives. That is to say, it is laid down that a particular food must contain none at all of ingredient X. Since an analyst can only determine that the concentra-

every food must be printed on its wrapper; it can, however, as these proposals do, recommend that the names of the ingredients from which a product is compounded should be made available on it for those who want to know.

From "The Royal Institute of Chemistry Journal" (88, 375, 1964). Permission to reprint is gratefully acknowledged.

NEW DIRECTOR CAMPDEN RESEARCH STATION

The Fruit and Vegetable Canning and Quick Freezing Research Association, Chipping Campden, has announced the appointment of Dr. Francis Aylward as Director of Research at Campden in succession to Mr. W. B. Adam who retired on 31st March, 1965.

Dr. Aylward, 53, has degrees in Chemistry and Biochemistry (Ph.D., D.Sc.) from the University of Liverpool, is a Fellow of the Royal Institute of Chemistry and of the Royal Society of Medicine and a Member of the Society of Chemical Industry, Biochemical and Nutrition Societies.

He is at present on the staff of the Food and Agricultural Organisation of the United Nations as Director of the United Nations Special Fund Food and Nutrition Project in Poland, following earlier assignments as F.A.O. Scientific Adviser on Foods and Nutrition to Government of Ghana. His main interests have been (i) chemistry and biochemistry of fats and allied substances, (ii) food science, technology and nutrition.

Food Technology in Russia

About 5000 students were enrolled in 1963 at the Moscow Technological Institute for the Meat and Milk Industries. Teaching staff comprises 33 professors and 220 other members.

Courses of study, which are organized in six Faculties, take from 4½ to 5½ years and about 900 students graduate every year.

tion is less than one part per million or per ten million, or for whatever amount the sensitivity of his method allows, the only way in which a manufacturer can obtain clearance is not to submit his product to analysis. The Food Standards Committee have avoided this trap, at least for preservatives, antioxidants and mineral oil, by not objecting to the undisclosed presence of less than five per cent of the maximum amount permitted by the Preservatives in Food Regulations, the Antioxidants in Food Regulations and The Mineral Oil in Food Regulations.

The sensible approach of the Committee is well shown in their comments about the labelling of alcoholic beverages. For instance, they say quite bluntly that the description *non-alcoholic wine* is an offence both against common sense and the Act. They also rule — and not before due time, too — that expressing alcohol content in terms of *proof spirit*, where *proof* in Great Britain (but not in America) is 57.06 per cent alcohol by volume at 51°F, is ridiculous and should be replaced by percentage by volume.

The new report will be welcomed in most quarters as a further step forward in an area where there is, in this country, need for advance. The twin demons of *suggestio falsi* and *suppressio veri* are to be found all too frequently in statements about articles of food and drink. But apart from these, the problems posed by the advancing knowledge of food chemistry are real and difficult. For a generation, nitrogen trichloride was an accepted additive to flour before the first hint of its pharmacological effect on animals was discovered. For a century, the presence of tyramine in cheese has been known. And only now has it come to light that this substance, which is not an *additive* but a *natural preservative*, may produce quite alarming effects in patients who happen to be under treatment with the drug tranylcypromine. No statutory regulation can hope to lay down that a complete analysis of



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BOOK REVIEWS

- *"RHEOLOGY OF EMULSIONS"*, by P. SHERMAN (Ed.), 146 pages, Pergamon Press, Oxford, 1963. £2.10.0.

This book contains ten papers presented at a symposium on the *"Rheology of Emulsions"* which was held by the British Society of Rheology at Harrogate in October, 1962.

Hitherto, theories of emulsification have been mainly concerned with the physico-chemical aspects of the stabilization of the dispersed phase once it has been formed and consequently there has been no explanation of the rheological problems involved. In a very interesting paper, Raja Gopal has considered the hydrodynamic aspects of emulsion formation. A mechanism is proposed for the disruption of the bulk interface between two liquids leading to the basic formation of the dispersed phase. This is based on the instability of the interface when it is accelerated from the less dense to the more dense fluid. The results of some novel experiments give general support for the proposed mechanism.

The contributions of van den Tempel, Sparnaay and De Vries are concerned with the influence of attractive and repulsive forces between droplets on emulsion stability and the effect of shearing forces on the flocculation kinetics.

Mason's paper on the theoretical and experimental study of the behaviour of deformable drops in laminar shear flow is presented only in the form of a short abstract.

The paper of Shotton and White describes their attempts to estimate the effects of particle size distribution and the nature of the oil on the stability of oil-in-water emulsions stabilized with gum acacia. The stability and viscosity-ageing of a series of such emulsions has been shown to be related to the formation of a

microscopic film of gum acacia at the droplet interface.

Sherman is concerned with the influence of emulsifier concentration on the flow properties of oil/water emulsions stabilized by sorbitan esters and particular emphasis is given to the effect exerted by the variation in mean globule size.

Hanai, Koizumi and Gotoh have presented the results of their extensive investigation of the dielectric behaviour of emulsions at rest and under shear. Whereas the O/W emulsions shown no appreciable change in dielectric behaviour on the application of shearing stress, the dielectric properties of the W/O emulsions show remarkable changes which may be caused by the breaking up of particle agglomerates.

Gillespie has examined literature data and some new data on the viscosity of suspensions and emulsions using Goodeve's concept of the additive effects of hydrodynamic and structural viscosity. Particular attention has been given to the variation of hydrodynamic viscosity with concentration.

Shaw describes the creep measurements on normal and melted ice cream which were performed as part of a study to determine the physical structure of ice cream. The results presented are discussed in terms of a theory that the structure of normal ice cream is based on a network of fat droplets which are enveloped and joined together by denatured milk protein.

It is considered that, although this volume would not be particularly satisfying to rheologists in general, it should be of considerable value to anyone whose prime interest is with emulsions.

Reviewer: Dr. G. E. Hibberd,
Bread Research Institute of
Australia, North Ryde, N.S.W.

- *"TOMATO PASTE, PUREE, JUICE & POWDER"*, by PETER G. GOOSE and R. BINSTED, 151 pages, Food Trade Press Ltd., London, 1964. £2.10.0.

The Tomato, because of its versatility, is continuing to find increasing acceptance throughout the world and, on a tonnage basis, is now rated the fourth most important fruit.

The development of intermediate products such as paste and to a lesser extent, powder, has greatly increased the importance of the tomato. It has enabled the economical production of product for retail sale to be produced in close proximity to its market while the paste, itself, is canned near the growing area.

Italy is one of the world's largest tomato producing countries and considerable quantities of these products are exported each year to Britain and other parts of Europe.

The authors of this publication have been associated mainly with the industry in Italy and most of the practical aspects described are based on the methods used in this region.

The chapters on the growing of tomatoes, the varieties used and the methods of manufacture are well described and the information contained would be most beneficial to all canners. In particular, the smaller processor would find many helpful hints on how to obtain the best final product from his raw material. However, the details listed for the performances of different tomato varieties are specific for that region and must be used only for comparative purposes. These varieties grown elsewhere may not produce anything like the same results.

An intermediate product must be produced with even more rigid regard to quality standards than the final article, and it was pleasing to note that the authors devoted considerable space to quality requirements and quality control. Particularly interesting is their discussion on colour and colour measurement,

which is probably the most difficult of all properties to standardize.

The valuable information contained and the simplicity of explanation and description, makes this book a most worthwhile guide to all technologists and manufacturers concerned with the tomato industry.

Reviewer: J. V. Dossiter, Chief Chemist, Leeton Co-operative Cannery, Ltd., Leeton, N.S.W.

- *"CHOCOLATE & CONFECTIONERY"*, by C. TREVOR WILLIAMS, 3rd Edn. 238 pages. Leonard Hill (Books) Ltd., London, 1964. £2.2.0.

It is eleven years since the second edition of C. Trevor Williams' *"Chocolate and Confectionery"* was printed, and this fact alone makes it obligatory for anyone with an interest in the industry to add it to their shelf.

The author's aim with all three editions has been to provide "an up-to-date textbook for technical students undertaking courses in chocolate and confectionery production . . ." Herein lies the book's strength. It is hardly likely that the design engineer, analyst or production engineer engaged in the industry will solve all or even many of their problems by means of this text.

However, this is a bridging publication, joining the traditional craftsman, to the present day skilled processor, up to the production technician of tomorrow; and it is easy to sense the phasing out of the first mentioned.

The student is led through the course beginning with a brief history of confectionery, to sugars, physical testing, colloids, etc., with the bulk of the text concerned with equipment, methods and formulae. Some ninety diagrams and plates clearly illustrate most of this equipment. Unfortunately, and it is an indictment of the industry, the bibliography has only seven refer-

ences, the earliest 1918 and the latest 1951.

Readers may well be disappointed with the sketchy treatment given to glucose syrup, the confectioners' second most important raw material, in the light of the considerable technical advances made of recent times.

To criticize this book from a distance of 12,000 miles is not difficult; it would however be very fair comment that if Australia had courses as are held in the United Kingdom and Europe, specifically serving the chocolate and confectionery industry, we would be very thankful to have such a book upon which to base the course.

Reviewer: Don Jarman, James Stedman, Henderson Sweets Ltd., Sydney.

BREAD STALING

New knowledge of the bread staling process may result from a five-year study to be conducted by the British Baking Industries Research Association. In the past, research on bread staling has been hindered by the difficulty in distinguishing between an effect on initial crumb softness and an effect on the rate at which starch changes take place. Recent work by the B.B.I.R.A. has shown that these two effects can be distinguished if crumb firmness is measured as a carefully defined modulus of elasticity, F , and staling is measured as the fraction, $F_t - F_0 / E_{\infty} \cdot E_0$, where F_t is the modulus at a time t after baking, and E_{∞} is the modulus value to which the measurements tend after a long period. (*"Cereal Chem."*, 41: 216-229. 1964). Studies using this technique have already shown that a physical change, such as crystallization, in the starch gel of the crumb is the major factor influencing staling. This approach, among others, will be used to examine the effect of various factors on changes in the starch fraction and perhaps new means will be found to retard these changes.

I.F.T. AND WORLD FOOD PROBLEMS

About two years ago the Institute of Food Technologists formed a Committee on World Food Problems.

A Technical Sub-committee has prepared a roster of approximately 1500 food technologists in the United States who have expressed willingness to help in international problems and activities, ranging from answering technical questions to short- and long-term assignments abroad. The Sub-committee answers specific questions directed to it, locating persons who know the answers and relaying the replies. The Voluntary Assistance Agency, which answers all sorts of questions directed to it, forwards questions on food technology to the committee of the Institute. The problems cover a tremendous range of subject matter, and finding the answers sometimes requires a great deal of effort.

An Institute Sub-committee on Training Programmes, chaired by Dr. Chichester of the University of California at Davis, deals with the problem that many of the foreign food technologists studying in the United States must take prerequisite courses which are of little interest to them, and must do thesis work which is perhaps too sophisticated to be applied to their own countries, and many of them become frustrated on returning to their positions. The hope is that the Sub-committee can influence training so that it will better answer the needs of those who go to the States for study.

Personal . . .

Mr. J. Czulak of the C.S.I.R.O. Division of Dairy Research will visit the U.S.A. shortly to advise on the operation of automatic cheese-making machinery.

He will be away for about six weeks and will return via the U.K. where he will examine trends and prospects in cheese mechanization.



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CAN HANDLING

recommendations for post processing can handling

These recommendations apply to the handling of cans during and after cooling, including labellers, twistlers, etc., and to the design, construction and operation of the post processing can handling equipment.

In view of the lighter weight cans now in general use and the almost complete mechanization of handling of these cans from their entry into the cannery all the way through the process to the warehouse, it will come as no surprise that improvements in handling are indicated if excessive damage is to be avoided. At the N.C.A. Convention in Dallas four separate speakers, a canner, a Food and Drug Official, a representative of the Steel companies and a representative of the can makers, discussed the advantages and disadvantages of the new containers in detail. Their papers were printed in full in the N.C.A. Information Letter of the Convention.

Now come these timely recommendations from the Task Committee for post processing can handling and approved by the Committee on Sanitation of Canning Equipment on February 2. These Committees are made up of representatives from industry, the National Canners Association and the Canning Machinery and Supplies Association. They are reprinted with permission from the Information Letter of March 7.

PURPOSE

1. To serve as a guide to builders of post processing can handling equipment.

2. To serve as a guide to canners.
3. To serve as a guide for modification or alteration of present post processing can handling equipment.

NEW DEVELOPMENTS

It is intended that this recommendation shall allow and encourage freedom for inventive genius and new developments. Equipment developed which is different in design, material, construction, or in other features which are, in the opinion of the manufacturer or fabricator, equivalent or better, and which accomplishes the desired results, may be substituted at any time.

GENERAL

Food preservation by heat processing in cans depends upon the fulfillment of two conditions:—

the destruction by heat of bacteria capable of spoiling the food product, and

the prevention of bacterial recontamination of the product by means of the sealed container.

Although heat processes have been developed that will insure the destruction of spoilage organisms normally present in the canned product, there remains the hazard of re-entry of spoilage bacteria dur-

From "The Canning Trade", March, 1964.

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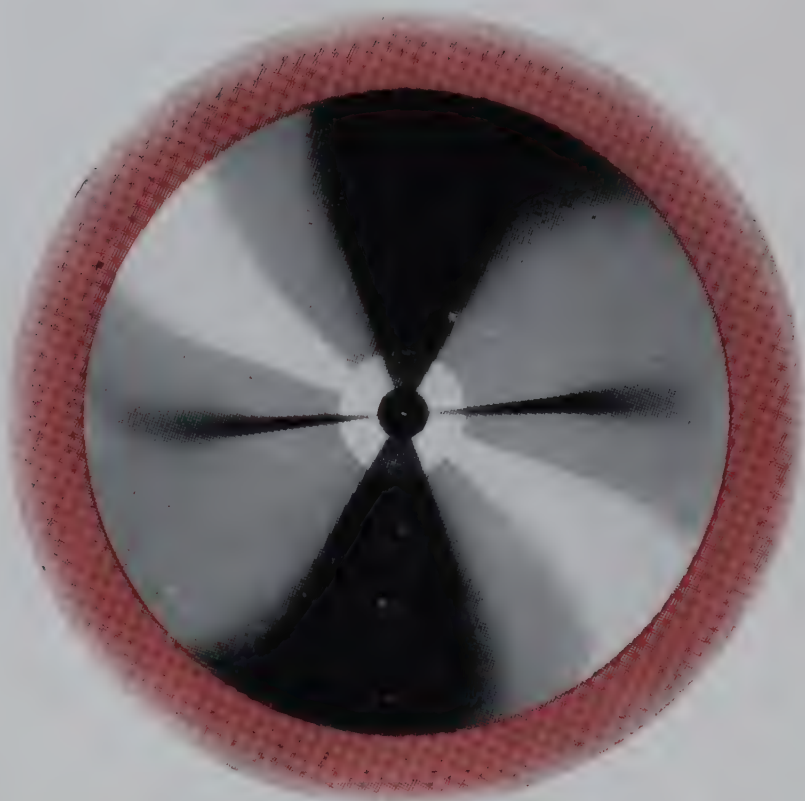
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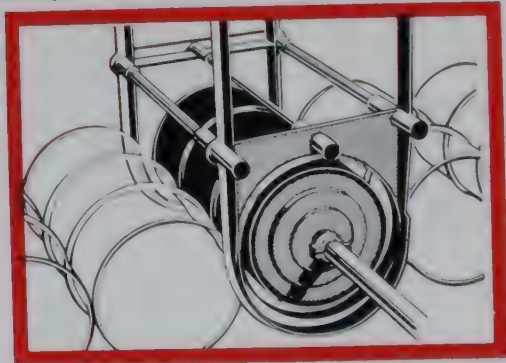
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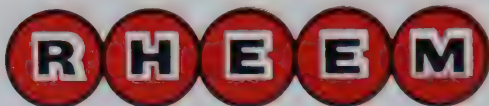


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ing post processing can handling operations.

The advent of double reduced tinplate and aluminium can calls for a fresh approach to can handling methods. Also the trend in modern canning practice has been toward higher final vacuums in canned foods. Subsequent to the heat processing operations, the canned product is usually cooled by water. During the cooling operations, the filled cans go from pressure to vacuum and, in most instances, enter automatic or semi-automatic can handling lines. When filled cans are handled in automatic equipment at high speeds, small deformations of the seams may be more significant as spoilage factors than they are under slow speed, low impact conditions.

SPOILAGE FACTORS

1. The quality of the can double seams.
2. The presence of bacterial contamination in cooling waters or on wet runways.
3. Excessive abuse due to poor operation or adjustment of the filled can handling equipment.

OPERATING PRECAUTIONS

1. Inspect can seams frequently to insure that they are properly formed and that seamer adjustments have not exceeded tolerances.
2. Periodically inspect the can handling system from the closing machine to the caser. Where rough handling of the cans is apparent, smooth out the operation to minimize can seam and body damage. Roll in casers must be adjusted carefully to prevent violent can to can contact or can seam to can body contact.
3. Do not allow cans to drop freely into crates from closing machine discharge tables.
4. Do not overfill the retort crates. This will eliminate protruding cans which could be crushed by the crate bales or by crates placed on top of them in the retort.

5. Prevent sharp impacts between filled crates or against protruding points.

6. Operate crate dumps smoothly to prevent impact denting.

7. Chlorinate all cooling waters to a point where there is at least one part per million chlorine residual at the discharge end of the can cooler. If chlorination renders the water corrosive, use a suitable corrosion inhibitor.

8. Thoroughly scrub and sanitize all tracks and belts which come into contact with the can seams at intervals frequent enough to prevent bacterial build-up.

9. Replace all worn and frayed belting, can retarders, cushions, etc., with new non-porous material.

10. Run cans through a can drier immediately on leaving the cooling system or tip the full retort baskets to drain water trapped on can ends and allow the cans to dry in the retort crates before discharging into the can handling unit to lessen the recontamination hazard.

High velocity air blasts over the body and ends of cans remove excess water and maintain dry can tracks. Dry conditions do not encourage the development of bacterial contamination.

Bacteria may develop on can handling equipment in a film of water, lubricants or other material. Bacterial contamination of the contact point of the can body and double seam can be significant and drying methods that permit contamination and then remove visible water but leave contaminated water at this point, may not be sufficient.

Chlorinated cooling water (Item 7) will tend to depress bacterial numbers on wet can runways after cooling, but the effect rapidly dissipates in relation to the distance of travel from the cooler.

11. Deliberate wet conditions can be tolerated by continuously running or spraying a sanitizing solution of water containing 3 to 5 ppm of free residual chlorine on the can



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tracks. Adequate control of continuous drippage must be provided and the cans must be dried before entering the labeller.

12. Can transporting belts and elevators, unless completely dry, should be continuously sprayed at the beginning of the return with water containing 3 to 5 ppm of free residual chlorine.

SANITARY DESIGN

Under present day production pressures, filled and sealed can handling equipment must be designed to minimize pick-up of bacterial contamination around the double seams. The design must also prevent shock, strain, or even small denting of the cans, particularly on or near the seams. This may cause aspiration of minute amounts of moisture even through well made seams. Spoilage may result if the moisture contains bacteria. The engineering and design objectives of post processing can lines should include the above considerations:—

- (1) Minimize contamination, and
- (2) prevent shock, strain and denting (rough handling).

The following are recommendations to help accomplish these objectives:—

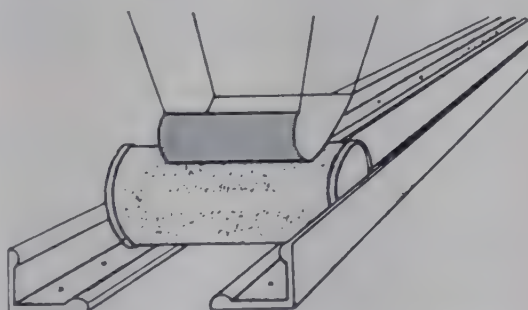
1. Keep handling to a minimum. All switchbacks, quarter turns, lowerers and other changes of can direction or orientation should be engineered according to can speed, size and weight to minimize strain. In general, sharp reversals of direction should be avoided. Quarter turns should have a long radius to handle the cans gently.

2. The need of *bumpers* should be avoided, but where necessary they should be of non-absorbent, easily cleaned material. Fabrics, wood or absorbent core belting are not satisfactory as they will support high bacterial populations that cannot be eliminated. This source of contamination is at the point where shock and seam strain occurs, and the harder the bump the greater the

hazard. Such bumping also increases the hazard from contamination picked up from subsequent equipment.

3. If possible, eliminate all rolling cans where can to can contact may occur. Each can should be positively controlled as far as practical, such as by flat belts or cables, and the drive mechanism automatically controlled so cans cannot slam into each other or have seams strained or damaged by belts and cables continuing to run under jammed (stopped) cans. Plastic covered cables are sanitary and considerably reduce friction and abrasion between cable and cans. Line flow controls, if properly installed in right locations, will permit an even flow of cans without jamming and will shut off power-driven belts or cables when conveyors are full.

4. When cans are rolled, the slopes, can spacing and can speeds should be engineered to prevent cans bumping each other. This is a common cause of seam strain and damage. Can track adjustments and can and guide clearance tolerances should be such as to assure that any unavoidable can to can contact will be seam to seam contact and not seam to body contact.



5. When cans are rolled the double seams should not contact the runway surface except in coolers. In angle iron runways installation of metal half-rounds as illustrated is one possibility to keep the can double seams from contacting wet or damp angle iron guides.

6. In the type of construction illustrated, drill weep holes to prevent water accumulating in the tracks behind the half rounds. In

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all cases install properly, or use drip pans, to prevent water from one can track dripping onto another track or cans below. Also consider safety, housekeeping, appearance and comfort hazards caused by dripping water.

7. Where cans pass between belts or other retarders, and on some elevators, cut away the contacting material so that the can double seams ride free of contact (see illustration). Also do not slow the can to the extent the following cans will bump into it.

8. At palletizers and other take-off and transfer points, provide for a continuous and gentle deceleration of the cans. Usually this requires a take-off belt so the cans are moved out of the way of the following can so violent impact cannot occur. Do not run cans at high speed into a dead end where they are stopped suddenly by bumping into the can ahead.

9. Dirt and organic debris, as well as bacterial contaminations will accumulate on can handling equipment. The equipment must be designed and installed so it can be cleaned. This means it must be accessible for cleaning and as water, detergents and sanitizers will be used, in a location that provides drainage. In some installations drip pans or other shields will be necessary.

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"INSECTICIDE RESISTANCE AND VECTOR CONTROL"

Thirteenth Report of the W.H.O. Expert Committee on Insecticides. 227 pages. World Health Organization. Technical Report Series, No. 265. World Health Organization, Geneva, 1963. \$2.25. (Also published in French and Spanish.)

Between 1956 and 1962, the number of insect species of public health importance definitely proven to be resistant to one or more insecticides rose from 20 to 81, of which 35 are resistant both to the D.D.T.-group of chlorinated hydrocarbons and to the cyclodiene derivatives, such as dieldrin. There are also 8 species resistant to the organophosphorus compounds and most of these show cross-resistance to the carbamates. Thus, while the number of available insecticides has grown rapidly and new groups of compounds have been introduced, the magnitude of the resistance problem continues to increase.

In its thirteenth report, the W.H.O. Expert Committee on Insecticides summarizes the information available on resistance at the time of the meeting in November, 1962.

One of the main tasks of the Committee was to review the procedures used for the determination of susceptibility or physiological resistance to insecticides.

In view of the problems posed by resistance and the possibility of harmful effects from insecticides, considerable efforts are being made to find alternative methods of vector control. These are reviewed by the Committee and their present uses and possible future applications examined. Finally, the Committee has revised and considerably expanded the annex "*Recommended methods for vector control*", originally issued in 1958 and first revised in 1960. This provides information

on the latest advances in the use of pesticides for the control of arthropods and rodents, including certain non-vector insect species of public health interest.

"HANDBOOK OF LABORATORY DISTILLATION"

By E. Krell, 561 pages, Elsevier Publishing Co., Amsterdam. London and New York, 1963. £5.0.0.

"CENTRALIZED PROCESSING OF FRESH MEAT FOR RETAIL STORES"

U.S.D.A. Marketing Research Report 628, Superintendent of Documents, Washington, D.C. 20402. 76 pages.

"Ageing of Farm-cured Hams as Affected by Method of Cutting, Curing, and Smoking"

By A. M. Gaddis and others. United States: Agricultural Research Service. Utilization Research Report 4. Washington, D.C. 1964.

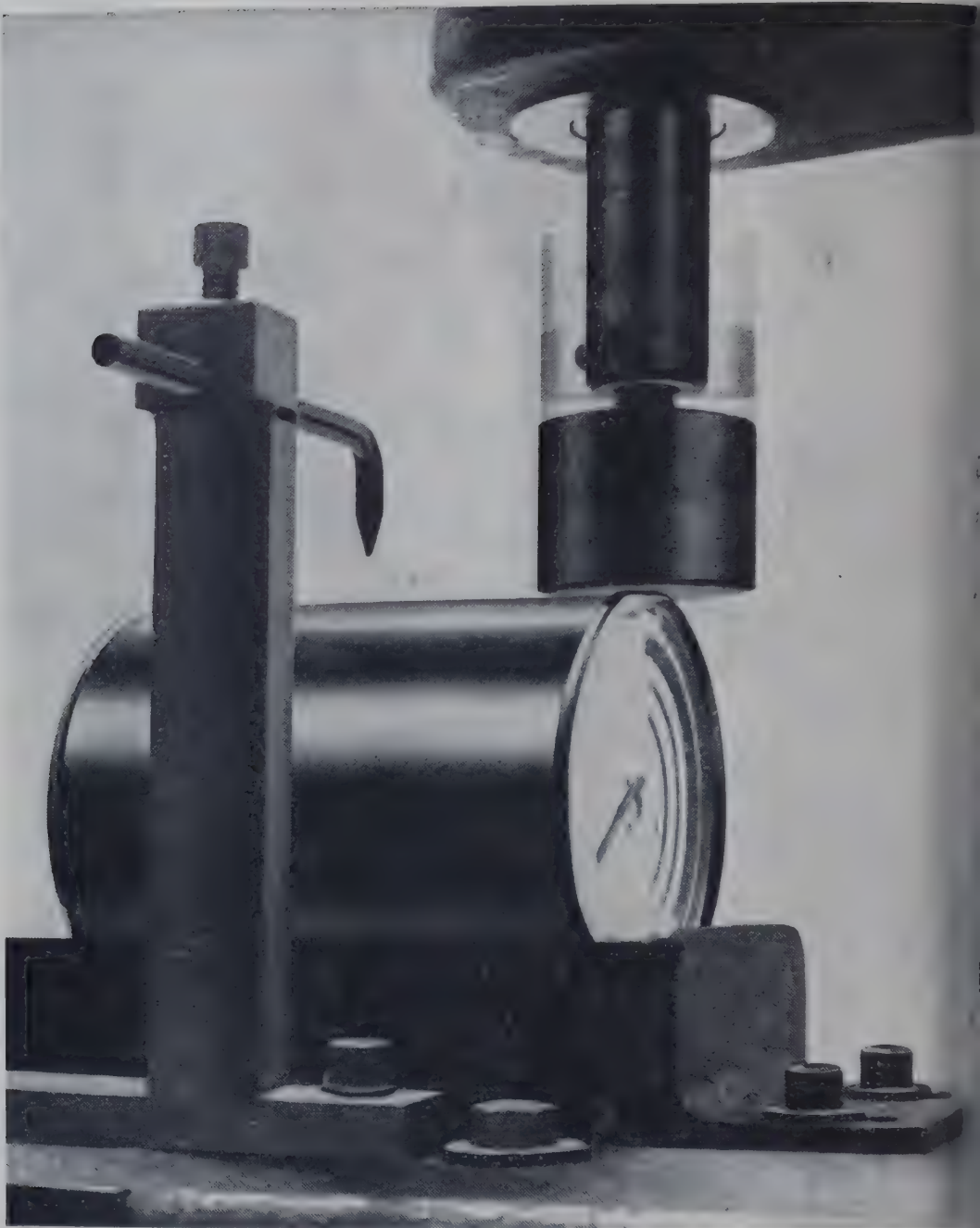
"Consumer Practices in the Handling and Storing of Commercially Frozen Foods"

By Ruth A. Redstrom, Elizabeth Davenport, and Janet Murray. U.S. Dept. of Agriculture, Agricultural Research Service, Washington, D.C. 1963.

"Review of the Persistent Organochlorine Pesticides"

Report by the Advisory Committee on poisonous substances used in agriculture and food storage. 67 pages. Ministry of Agriculture, Fisheries and Food, H.M.S.O., London. 1964.

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A stage of the controlled can abuse test showing a can being intentional abused by measured impact at the lap area of the seam.

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...ples of cooling water being tested in the Grace biological laboratory. A ...ff Biologist checks the bacteria count.



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Photomicrograph of the double seam of a can at the lap, showing the seam structure. This is a critical area for can sealing.

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PACKAGING

Some Effects of the Composition of the Storage Atmosphere on the Behaviour of Apples Stored in Polyethylene Film Bags

Experiments were carried out during a period of five years with Jonathan, Delicious, and Granny Smith apples, stored at 32°F in polyethylene film bags. After storage for five to seven months best retention of ground colour, least weight loss, and least wastage from superficial scald and low-temperature breakdown were obtained in bags in which the levels of oxygen were low (minimum 3.6 per cent), or in those in which the levels of carbon dioxide were high (maximum 6.7 per cent). Low-temperature breakdown was decreased markedly when calcium chloride was placed inside the bags to reduce the humidity. The use of calcium hydroxide to absorb carbon dioxide did not reduce the disorder.

K. J. Scott*, E. G. Hall, E. A. Roberts† and R. B. Wills. "Aust. J. exp. Agric. Anim. Husb.", 4, 253, 1964.

•

Packaging Freeze-Dried Products

Eleven major packaging material producers and converters have joined with the Batelle Memorial Institute, Columbus, Ohio, in support of a study to determine the future role of packaging for freeze-dried products. The research anticipates a substantial improvement in freeze-drying techniques in the next several years and their application in processing a broad range of food and pharmaceutical products. As freeze-drying moves from batch processing to continuous techniques, there should be many opportunities for new packaging developed specifically for freeze-dried products. Such packaging will,

among other things, have to seal out moisture and gases.

Because freeze-drying is a highly complex process, it is important that those concerned with future packaging requirements have ample lead time to prepare for the technological and market changes that this process is expected to create. Specifically, the study is expected to indicate: (1) what products are likely to be freeze-dried and when (2) the technical properties and requirements for packaging freeze-dried products, and (3) the location and size of the current and potential markets for freeze-dry packaging materials.

•

Hazel-Atlas Develops New Glass Coatings

Exclusive development of two new coatings for glass containers, one for use on non-returnable beer and soft drink bottles and the second for application to all other glass bottles and jars, has been announced by the Hazel-Atlas Glass Division of Continental Can Company. The coatings were developed and have been thoroughly tested at the Division's research laboratories in Plainfield, Illinois, as well as on customer filling lines.

According to Hazel-Atlas, the coatings will mean decreased breakage on glass container filling lines, in shipping and in trade distribution channels. This reduced breakage will also lower filling line *downtime* and product loss in glass packing plants. These new coatings follow the current trend toward permanent-type materials that protect the container all the way to the consumer.

Hazegard A, the coating meant for all uses but one-way beer and carbonated beverage bottles, is a modified glyceride. The Hazegard B coating, for beer and soft drink bottles is a permanent wax-type. The coatings can be applied at all Hazel-Atlas plants at no upcharge over glass container prices.

Packaging Machinery — World Wide Inquiry Service

A new communications method between users of packaging machinery throughout the world and American manufacturers of such equipment has been established by the Packaging Machinery Manufacturers Institute (P.M.M.I.), the trade association consisting of 100 leading U.S. manufacturers in the field.

Known as the "I.N.Q. Bulletin" (for Information Needed Quickly), the free service will provide a central point through which anyone with a packaging problem can call upon the vast technological experience represented by the membership of P.M.M.I.

To utilize the service, a firm or individual need only request information, or state the specific problem fully, in a letter to P.M.M.I. headquarters, Room 863, 60 E. 42nd St., New York, N.Y. 10017, U.S.A. Each inquiry is then reproduced in full and sent to every member of the organization. P.M.M.I. members in a position to solve the problem, or supply the machinery requested, reply directly.

•

Guiding Principles and Problems of a Voluntary Scheme to Regulate the Use of Plastics in Food Packaging

In the absence of legislative control of food packaging materials in Great Britain, the British Plastics Federation has undertaken to regulate in a voluntary manner the use of materials which may migrate from plastics into food.

The scheme is operated on the basis of allocation of *Toxicity Factors*, from which, if the migration characteristics of a substance have been ascertained, a Toxicity Quotient may then be calculated. The sum of the Toxicity Quotient for the principal extractable ingredients determines the use of the plastics in

contact with any particular food. The advantages of the scheme are discussed in an article by L. Goldberg in "Food & Cosmetics Toxicology", 1, 199, 1963.

The application of these principles to specific classes of material such as polymers and formulations is considered. Inconsistencies and difficulties are discussed in relation to their effect on safety evaluation.

LIQUID SMOKE

Although only at the laboratory stage, a technique has been evolved at the D.S.I.R. Torry Research Station, Aberdeen, for condensing the smoke used for fish smoking to give a liquid containing all the chemicals essential to the smoking process. The work was undertaken to improve an earlier method which, although it produced a dip giving products of excellent quality, was inefficient, and had no economic advantage over the traditional methods.

An apparatus has been designed and built in which wood may be pyrolysed under controlled conditions in a restricted air supply. The resulting smoke vapours are subject to a controlled oxidation process, the smoke then being passed through a condensing system to form a smoke dip.

Although further work remains to be done on this process results so far are extremely promising. The product yield is between five and ten times that obtained by the former method of preparing dips. Kippers and smoked white fish prepared by the new method have been of good quality and appearance.

An account of this work is to be found in the Annual Report of the Torry Research Station for 1963 (H.M.O.S. 4s. 6d).

In political matters much may be said on both sides, and it always is.
— Unknown

The Typhoid Outbreak in Scotland

This report concludes that the most probable cause of the outbreak was the sale and consumption of canned corned beef from a particular plant in Argentina, which, in the light of evidence produced, was the carrier of *Salmonella typhi* derived from unchlorinated river water used in the cooling process.

COMMITTEE OF ENQUIRY REPORT

On the evening of Tuesday, May 19, 1964, the Public Health Department in Aberdeen, Scotland, was informed of the admission of two patients to the City Hospital, as suspected cases of Typhoid fever.

This diagnosis was confirmed on the following day.

By the following night, 14 confirmed or suspected cases of typhoid had been admitted, and by the time the outbreak had run its course, more than 400 people had become victims of the bacterium *Salmonella typhi*.

Following the Aberdeen typhoid outbreak, the then Minister of Health and the Secretary of State for Scotland jointly appointed a Departmental Committee of Enquiry under the chairmanship of Sir David Milne. The terms of reference were to investigate the cause of the primary infection, and the means by which it was disseminated.

The report of this committee has now been published.

After assessing a mass of evidence, the report concludes that the most probable cause of the Aberdeen typhoid fever outbreak was the sale and consumption of canned corned beef from a particular plant in Argentina which carried the disease organism.

The report does not claim proof that the outbreak was so caused in

a scientific or legal sense. But having exhausted other lines of enquiry to the fullest extent, it has concluded that unchlorinated water, pumped from a river, and used for cooling purposes, was the likely source of infection.

The weight of evidence sifted by the committee and published in the report leaves little room for doubt as to the conclusions reached in the report.

Arising from the evidence considered were the following points:—

- Most typhoid patients had consumed cold meat or corned beef obtained from one supermarket.
- In one family of five, all were affected but one, who did not like, and did not eat corned beef.
- The possibility of one of the supermarket staff or a customer being a carrier was ruled out on medical evidence.
- Canned meat held in the store at the time of the outbreak was from Argentina, Australia, Paraguay and Brazil. *The report eliminated Australian produced corned beef from any association with the outbreak.*
- The report contends that minute holes in the can might admit bacteria from contaminated cooling water, that these holes might close as the can cooled further and that the bacteria would not always produce gas within the can. Contrary evidence was suggested, but the

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committee was able to state *"the possibility that a can of meat might be contaminated by typhoid bacteria during canning, and that this might pass undetected, can no longer be regarded as so unlikely as to be impossible"*.

- The typhoid bacterium which caused the outbreak — phage-type 34 — is not indigenous to the United Kingdom, but is found in Spain and South America. Typhoid is endemic in Argentina.

- Unchlorinated cooling water was in use at certain South American plants at the material times associated with the last three typhoid outbreaks in Britain.

- Most of the corned beef in the store at the time of the outbreak had been packed at an Argentinian plant in 1963 and 1964. During 1963 and until March, 1964, the chlorination plant for cooling water was out of action at this plant.

The Aberdeen typhoid fever outbreak is now over. The publication of the report of the Departmental Committee has pointed up the probable cause, and made recommendations designed to make a recurrence even less possible than it was before. Amongst these are:—

- Hygiene requirements to be observed by establishments exporting meat and meat products to Britain to be set out in a clear and detailed manner.

- All water used in the establishment, and likely to come in contact with the product, to conform to a minimum bacteriological standard of purity (equivalent to safe drinking water).

- United Kingdom inspection teams visiting overseas food establishments to include a medical doctor in certain circumstances.

- All overseas establishments exporting meat products to United Kingdom not yet inspected to be visited as a matter of priority.

- The Food and Agriculture Organisation of the United Nations be asked to set up, under the International Codex Commission, a system of inspection of all establish-

ments engaged in the manufacture for export of meat and meat products.

There are other recommendations, too, but most refer to administrative matters within the United Kingdom. [The large number of cases reported and their varying severity suggested that extensive contamination of other cold meats by meat from the infected can had occurred in the supermarket.]*

The report underlines the need for first class hygiene measures in meat handling establishments in all parts of the world in the interest of public health, and of the meat industry as a whole.

The conclusions of the committee of enquiry have been challenged by the Director of Animal Sanitary Services in Argentina, Dr. Aldo Saettone. He is reported to have said that Argentine experts had determined that canned meat from his country which may have been consumed in Aberdeen was not responsible for the typhoid outbreak. He claimed that typhoid carriers were found by Argentine experts among elements which had no contact whatsoever with Argentine meat. He also said that a serious scientific document should not speak in terms of **probable cause**.

*Added to the original text. — **The Editor.**
I.F.T. Award. Award Address.

MORE FRUIT PACKED IN PLASTICS

Recent amendments to the Victorian Fruit and Vegetable Packing Regulations permit the use of polythene or pliable paper for stone fruit and tomatoes in lots of less than $\frac{1}{4}$ bushel size, instead of cardboard cartons or wooden crates used previously.

The changes allow the use of pliable packs for other fruits providing the capacity is less than half a bushel.

The markings required on these packs are the same as those demanded in the past.

Packs which have already been abandoned for the new types include the $\frac{1}{2}$ long bushel and the strawberry punnet. The punnet has been replaced by a new raspberry punnet which is smaller and not as deep.



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FRUIT TECHNOLOGY

APPLES STORED IN POLYETHYLENE BAGS

For many years officers of the New South Wales Department of Agriculture and of C.S.I.R.O. have co-operated on research into problems of fruit storage. The investigations were carried out at the laboratories of C.S.I.R.O. Division of Food Preservation at Homebush until recent years. These laboratories are now centred at Ryde.

K. Scott of the Department and E. Hall, E. Roberts and R. Wills working at C.S.I.R.O. have recently reported investigations on the effects of the composition of storage atmosphere on the behaviour of apples stored in polyethylene bags (*"Journal of Experimental Agriculture and Animal Husbandry"*, 4 (14): 253-9).

Jonathan, Delicious and Granny Smith apples were used in studies of retention of ground colour and weight, wastage from superficial scald, and low temperature breakdown during storage. The authors found that the use of polyethylene bags greatly reduced the weight loss and maintained the fresh condition, but wastage from superficial scald and breakdown was often increased. The best retention of colour and weight and least wastage occurred in bags where the level of oxygen was low (minimum 3.6 per cent) and the level of carbon dioxide was high (maximum 6.7 per cent). Inclusion of packets of calcium chloride to reduce the humidity decreased breakdown, but further research is needed before commercial use can be made of this finding.

Other studies have shown that superficial scald can be prevented by treating the fruit with Ethoxyquin, which has recently been ap-

proved for use in New South Wales, or diphenylamine — which has not yet been approved in this country. Thus, susceptible varieties such as Granny Smith should be treated with Ethoxyquin prior to storage. Because of uncontrollable packaging factors the atmospheres which minimize breakdown cannot be obtained in every bag; consequently varieties selected for storage by this method should be restricted to fruit known to have a low susceptibility to low temperature breakdown.

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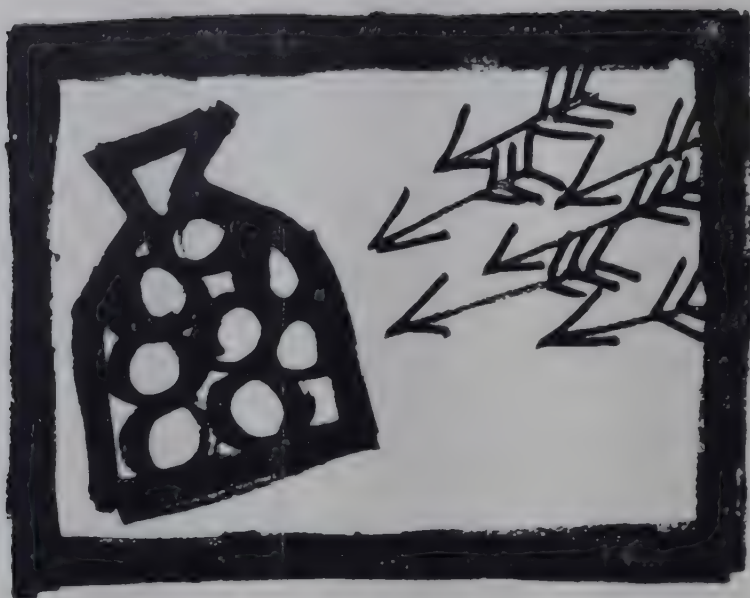
FRUIT INVESTIGATIONS IN TASMANIA

In the pome fruit trade, most wastage in storage or transport is due to physiological causes. Under refrigeration, the physiology of the fruit may become distorted and unnatural flavours and lesions produced, or the storage process may fail adequately to retard ripening and senescence. Presentation and handling costs in export fruit are extremely high (up to 80 per cent of the price received) and physiological disorders not only wastes this but the presence of affected fruit on the market depresses the value of sound fruit.

The tolerance of fruit to refrigeration depends on factors which fall into two main groups:—

preharvest factors; variety, nutrition, climate, growth, relative state of development at picking.
postharvest factors; storage temperature, humidity and atmospheric composition, handling and packing methods and weather before and after the storage period.

Although much progress has been made in reducing losses, there are still many problems to be solved. Wide variations in keeping quality in the same variety occur, the growth and nutritional basis of good keeping quality is only partially understood and the relation of seasonal and local climate to disorder and the prediction of potential storage life is still based on empiricism.



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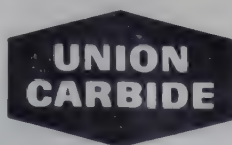
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The Fruit Investigation Unit of the C.S.I.R.O. Division of Plant Industry undertakes basic studies of tree and fruit physiology suited to Australian resources; evaluates under Tasmanian conditions recent advances in pome fruit storage and physiology; and suggests and assists in practical investigations by other bodies.

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APPLES IN COLD STORES

The Canada Dept. of Agriculture reports that apples from trees containing high levels of nitrogen have been found to develop severe core browning when stored at 32 degrees F but, when the oxygen in the storage atmosphere was reduced to 3 per cent and the temperature raised to 38 degrees F, the disorder was greatly reduced. Advantage has been taken of this effect commercially in the controlled-atmosphere storage of apples which permits the use of this higher temperature. However, under these conditions, other storage problems are now emerging, for example, storage scald, and CO₂ injury related to fruit maturity.

In controlled atmosphere storage, an increase in the carbon dioxide content tends to maintain firmness and inhibit rot development. Nevertheless, concentrations above 7 per cent are toxic to McIntosh apples and the storage atmosphere must be exposed to water, caustic soda or dry calcium hydroxide (hydrated lime) to absorb the excess carbon dioxide produced by the fruit. The use of calcium hydroxide as a *dry scrubber* was developed and first successfully applied for this purpose at this Research Station. It is rapidly gaining popularity as the least expensive absorbent for carbon dioxide and the one simplest to use; also, it has the special advantage that its use is not restricted to large storages. For example, small inserts with fruit packed in plastic-lined boxes or bins permit the regulation of a desired concentration of oxygen and carbon dioxide. This can be maintained during lengthy

periods of transport as has been demonstrated in shipments from Nova Scotia to the West Indies and to England.

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FLORIDA TURNS WASTE DISPOSAL PROBLEM INTO PROFITABLE BY-PRODUCTS INDUSTRY

Methods of utilizing the waste from citrus juice processing plants (pulp, peel and seed from selected fruit and the whole of the rejected fruits) are discussed in an article by J. W. Kestoren and R. Hendrickson in "*Canner/Packer*", April, 1964.

Citrus by-products include dried citrus pulp, citrus molasses, essential oils and stripper oils. Other potential by-products, not being manufactured at present, include citrus vinegar, lactic and citric acids, antibiotics and other fermentation products such as glycols, methane, waxes, pectin, *etc.*

•

SUPERFICIAL SCALD IN APPLES EXPLAINED

K. E. Murray, F. E. Huelin and J. B. Davenport report in "*Nature*" (204, 80, 1964) that previous investigation of the cuticle oil of the *Granny Smith* apple indicated that the presence of small amounts of a hydrocarbon with a conjugated diene absorption in the ultra-violet.

It has now been isolated and identified as the sesquiterpene farnesene (2,6-dimethyl-10-methylene-2,6,11-dodecatriene). Farnesene in the isolated fractions was observed to polymerize rapidly at room temperature in the presence of air, whereas it is stable in the whole extracted apple coating for about a year. Its labile nature and the fact that it constitutes at least 1 per cent of the *Granny Smith* cuticle oil fraction suggests that it may have a role in the development of superficial scald. Work is in progress to examine this hypothesis.

DEATH OF SIR ANDREW FAIRLEY

LEADER OF CANNING INDUSTRY

With the death in Melbourne, on Thursday, 15th April, 1965, of Sir Andrew Walker Fairley, chairman and managing director of the Shepparton Preserving Co. Ltd., the nation lost an outstanding identity in the fruit canning industry. Sir Andrew could well be called a pioneer of modern fruit processing in



Australia. From the moment he took charge, *near enough* was not good enough.

From a 200 ft square weather-board factory in 1922, when he joined S.P.C., he enlarged the buildings until at present they cover 17 acres. S.P.C. fruit products — apricots, peaches and pears — are sold in Australia and in 30 overseas countries.

Along with the gradual erection of new and modern factory buildings, there was a steady installation of new plant and the latest processing procedures. Similarly, he was steadily encouraging research on the growing of types of fruit most suitable for canning.

Equally important, however, was his perception that the marketing

and merchandising of canned fruit must be modernized. Shepparton Preserving Company became an important unit in the Australian canned fruits industry, a brand leader and an undertaking recognized throughout the western world for the high quality standards in the canning and marketing of deciduous fruits.

The work in this field was recognized by the Federal Government and Andrew Fairley represented the Co-operative Fruit Canneries (Shepparton, Kyabram, Ardmona and Leeton) on the Australian Canned Fruits Board since its inception in 1927.

Probably Mr. John McEwan, M.H.R., Deputy Prime Minister and Minister for Trade and Customs, best evaluated Sir Andrew Fairley's work when he said . . . "*at every level fruit canning and the fruit canning industry are greatly indebted to him for his splendidly successful work. Rare gifts of business capacity, skill in management of production and an immense knowledge of marketing were his gifts to the industry*".

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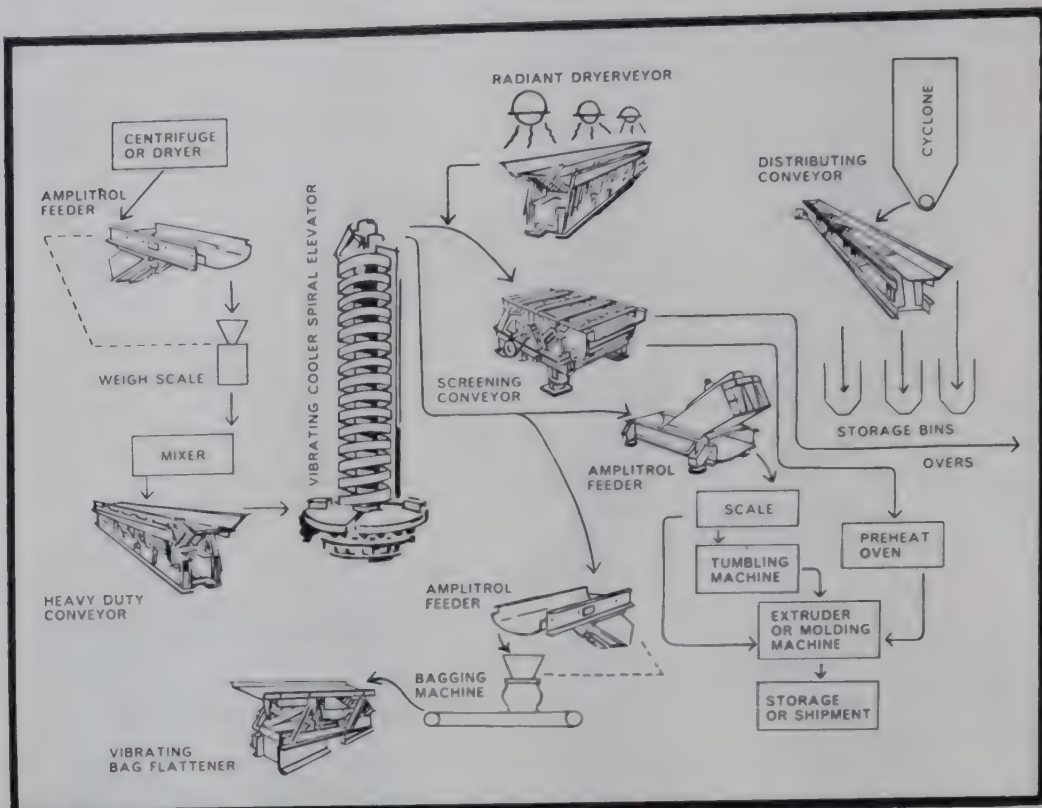
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FOOD STANDARDS SYMPOSIUM EXAMINES CONSUMERS' INTEREST

"The inherent and legal right of the consumer to know the composition of the food he eats applies just as much to a standardized food as to a proprietary food", a F.D.A. spokesman said at a Food Standards Symposium in Washington, D.C., December 1, 1964.

"The need to know is very real with the individual confronted with allergy problems. Whether from this standpoint, or on the basis of his right to know, we are receiving more and more expressions from consumers that they believe a standard will promote honesty and fair dealing only if all the optional ingredients are declared on the label.

In fact some feel strongly that the philosophy of the law that the composition of standardized foods is known and understood by virtue of the promulgation process is most unrealistic and that the labelling exemption in the law for standardized foods should be stricken," he continued.

"We think it is sound, as we move in the direction of meeting consumer demands for more and more ingredient declaration, that we should be able to provide in standards more freedom of choice for the use of optional ingredients so long as the consumers who purchase such foods under their standardized name can have assurances that they will get what they may reasonably expect to receive when purchasing them."

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INSTANT BERRY POWDERS

High-flavoured instant berry powders — suitable for use in dry mixes for ice creams, sherberts, pastries, and other foods prepared with berry juice or puree — have proved feasible in recent U.S. Department of Agriculture research.

Strawberry, raspberry, blackberry, and boysenberry powders were developed by engineers G. S. Williams, R. P. Graham, M. R. Hart, and A. I. Morgan, Jr., of U.S.D.A's Agricultural Research Service at the Western utilization research laboratory in Albany, Calif. The researchers believe other fruits — blueberries and cherries, for instance — can be similarly processed into powders.

Excellent retention of fresh berry flavour and aroma is achieved by using lower-than-cooking temperatures to make the powders. They dissolve instantly in cold water to make puree or liquid.

The new products offer substantial savings in shipping and storage space and costs — advantages that also make them a good export possibility, say the researchers.

The basic method for making berry powder is foam-mat dehydration, also developed in the Albany laboratory and now used commercially to make orange, lemon, and tomato powders.

The engineers use a variation of the foam-mat process called *crater drying*. A mix of two-thirds berry puree (with seeds removed) is prepared. With the addition of 1 to 2 per cent of soy protein or methyl cellulose as a stabilizing agent, the mixture can be whipped into foam.

This foam is spread in a *mat* on perforated metal trays and dried with warm air. A blast of air upward through the perforations causes craters. These craters increase the surface area of the mat and thus hasten drying. A succession of three air temperatures (200°,

170°, and 130°F) is used. Because of evaporation, the foam temperature never exceeds 135°F. When the mat is dried, it is crumbled between heated rollers to a flaky powder.

The powders contain only 1 to 2 per cent moisture and are about 80 per cent sugar. They must be packaged in containers that prevent absorption of moisture.

Producers and food processors interested in the new product may obtain further information on making berry powder by writing to the Western Utilization Research and Development Division, Agricultural Research Service, U.S. Department of Agriculture, 800 Buchanan Street, Albany, Calif. 94710.

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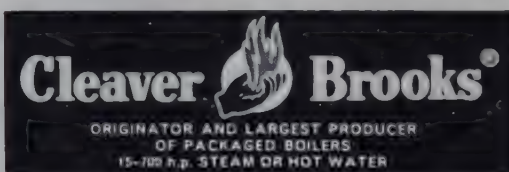
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NEW "RUBBER" MEAT CUTTING BOARD

Meat cutting boards made from synthetic rubber compound will be manufactured in Australia before the end of this year. The boards will be made in Australia by the Good-year Tyre & Rubber Company which claims they are so versatile and hygienic that wood cutting blocks will become obsolete.

Although the boards are designated *meat cutting boards* they perform as effectively with all types of foods being cut or trimmed.

Major advantages claimed are that the boards will not absorb juices or odours or harbour bacteria, will not chip, splinter or warp, and will not dull knife edges. The non-slip finish prevents slippage while food is being cut or trimmed.

It can be worked or cut by saw like wood into required sizes for fitting permanently to table tops.

The special compounds used in their manufacture have been approved by the Australian Department of Primary Industries and accepted by the Meat Inspection Division of the U.S.A. Department of Agriculture for use in Federally inspected U.S. meat packaging plants.

The new boards will have special appeal for meat packers, fish processors, slaughter houses, hotels, restaurants, hospitals, and other places where food is processed.

BULGUR, ALA, OR AMERICAN RICE

This is made by soaking wheat, boiling or cooking in hot water and then drying, and is one of the oldest processed foods known. It has recently been produced on a large scale, mainly in America. Some modern methods of manufacture are described by G. H. Edwards in "Milling" (142, 346, 1964).

It has been especially useful in some of the under-developed countries, as it can be used in a similar way to rice yet has better nutritive value. It is also known as mote in Chile.

EDITORIAL

(Continued from page 317)

countries have received training in canning technology under his supervision.

Mr. Lynch has for many years been Australian Liaison Officer for the Comité International Permanent de la Conserve and acted as advisor to the Commonwealth Colombo Plan Supplies Directorate on the supply of food machinery to Indonesia and Pakistan.

In 1962, Mr. Lynch's contributions to the international exchange of information in food technology were recognized when he received the International Award of the Institute of Food Technologists.

The best wishes of his numerous friends in industry and commerce, in universities and professional organizations follow Mr. Lynch into his retirement.

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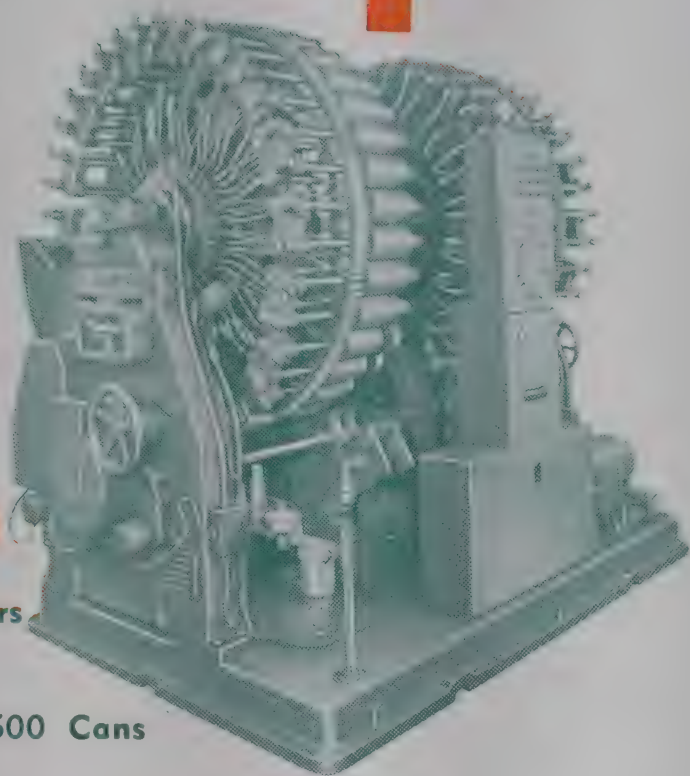
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FOOD TECHNOLOGY



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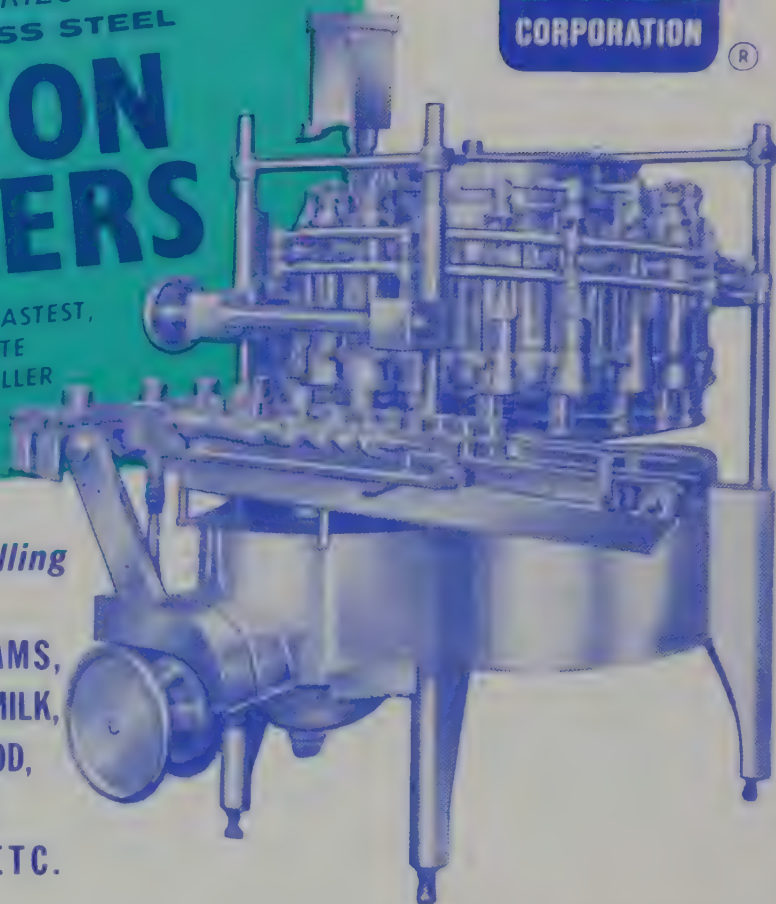
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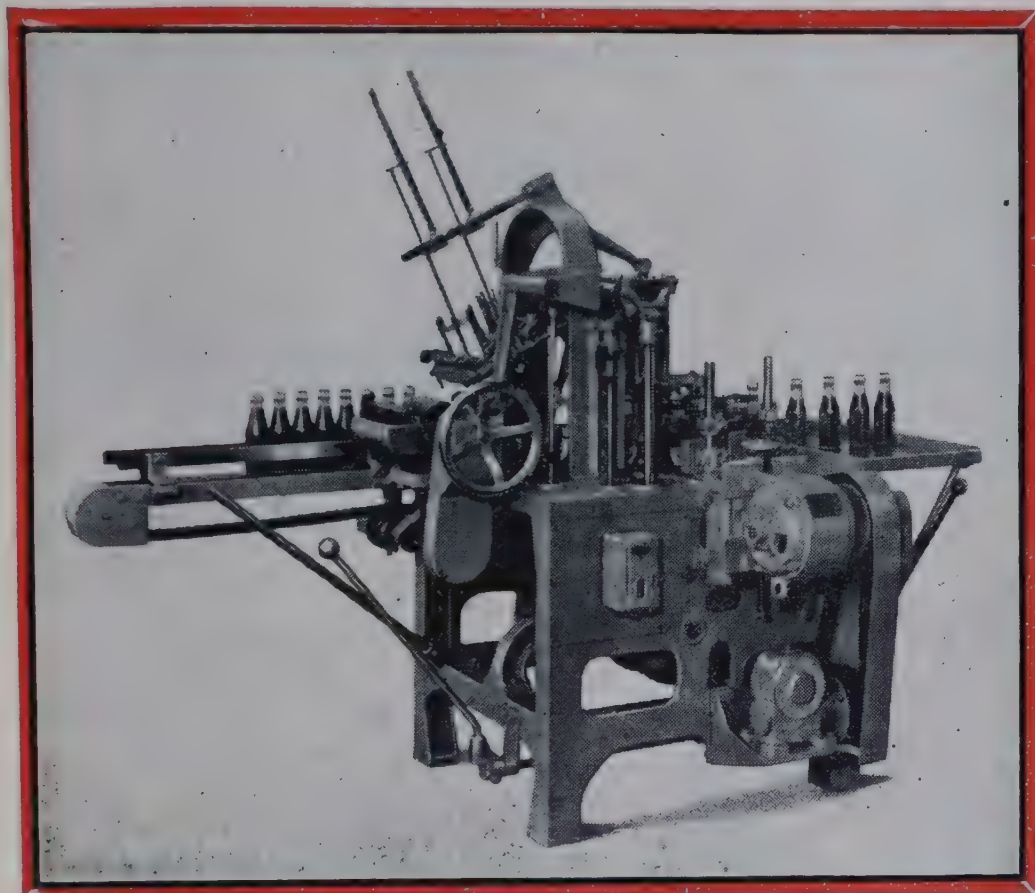
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Acting Editor:

R. A. EDWARDS, A.S.T.C., B.Sc., Ph.D.,
Senior Lecturer in Food Technology, The
University of New South Wales.

Business Manager:

S. M. ADAMS.

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The Journal Editor

It is some sixteen years, and one hundred and ninety odd issues ago, that this Journal first saw the light of day. Volume 1, No. 1, of August 1949, then referred to as the Federal Bulletin, was a modest enough affair that was to encounter severe economic setbacks in the first few years of its life. The fact that it survived, and indeed grew to its present stature, is now a matter of only historical interest, but speaks volumes for the dedication of those associated with it during the lean years.

With the Journal from the first issue, and perhaps in the best position to feel the vicissitudes and triumphs that go with such endeavours, has been the Editor, Professor F. H. Reuter. It is no easy matter to apportion credit for a co-operative venture such as journal production, but there would be few to deny that the Editor has been the mainstay, or that the current status of the Journal is of his making. This page in particular has been his sounding board for many years, providing informed and often provocative comment on the many items of interest to industry.

The publication of journals today is a competitive business, and must become more so in the years ahead. The fact that *"Food Technology in Australia"* is so successful is just as much a reflection of the skill of its Editor and Management Committee as it is of the respect with which C.A.F.T.A. and its constituent Associations are held. Now firmly established as the *vox populi* of the Australian food industry, the Journal is well received in some forty overseas countries, and is attracting copy of a high standard from Aus-

tralian sources at an increasing rate. As such it presents a bold face to both local and overseas readers, and reflects what must be regarded as a vigorous and developing industry in this country.

With the Journal now operating smoothly, at least as smoothly as any journal can operate, the Editor has, for the first time since 1949, relinquished the editorial role while he spends a sabbatical leave period overseas. Professor Reuter will take up a six month appointment as Food Technologist on a United Nations Special Fund mission to the Government of Chile. The terms of reference of his appointment are:—

"To survey and evaluate the basic and technical courses related to food technology given at the University of Chile at the present time. To plan curricula of food technology for the three levels (primary, medium and post-graduate) using as much as possible the courses now given and enlarging and integrating them with the relevant complementary courses to give a comprehensive theoretical and practical background to the students. The courses should not only provide eventual graduates with the professional skills required to serve efficiently the present needs of the Chilean food industries, but also aid the future evolution and the full development of the potential possibilities of the country. To work out a general scheme of the principal subject matters that the various courses must involve".

These terms of reference have a familiar ring and could well apply to a score of countries currently

— Continued on page 439



Technological Education

—A DECISION FOR AUSTRALIA

By Dr. R. V. CULVER,

Head of Department of Chemical Technology,
South Australian Institute of Technology, Adelaide.

INTRODUCTION

Deeply conscious of the privilege which has been extended to me, I propose this morning to talk to you about technological education. The title of my address is "*Technological Education — a Decision for Australia*", and, in view of what I have to say, I hope you will regard it as appropriate.

There is an ever increasing awareness of the problems confronting this young country of ours with its by no means unlimited resources. We need to expand our markets, and, in order to compete, we must improve the efficiency of established manufacturing processes, or better still, develop new techniques of our own. The future prosperity of our country, which we equate with an ever increasing living standard is dependent upon technological progress, and this, in turn, is largely dependent upon technological education. We are all involved, whatever our interests may be — production, sales, or research.

Far reaching recommendations have been made recently in the Martin Report on the Future of Tertiary Education in Australia. Particular mention has been made of the Technical Colleges which are to be resuscitated and, in fact, re-oriented. Technical work is to be leavened with the liberal arts; lower level courses are to be shed and, it has also been proposed that an Institute of Colleges oversee the whole field of tertiary non-University education in each State. During the next triennium, 1967-69, some

£24m. for capital and £34m. for recurrent expenses is to be provided by the States and Commonwealth. Student enrolment in these Colleges is expected to treble over the next decade and approach 100,000.

However, we should not regard the issue of a Report on the Future of Tertiary Education as the last word. Rather, it is the first. The present situation has been carefully examined; the Report reveals serious deficiencies in our approach to technological education and stresses our future responsibilities if these deficiencies are to be rectified. I might add that not all the recommendations have been accepted by the Commonwealth Government, but I am hopeful that within the somewhat flexible framework of the document there lies an eventual solution to Australia's educational problems.

Now, before dealing with technological education proper, let us first consider the *demand* for technically trained persons in Australia.

DEMAND FOR TECHNICIANS AND TECHNOLOGISTS

Technicians

At the sub-professional level there is a demand for the technician whose scope of activity, as a member of supporting staff, lies between the craftsman on the one hand and the professional scientist or engineer on the other. Clearly the func-

An address presented at the 15th Annual Convention of the Combined Australian Section of the Institute of Food Technologists, Adelaide, May 10-14, 1965.

tions of the technician tend to overlap those of the scientist or engineer at the higher sub-professional level.

Much has been said regarding the shortage of technicians, particularly in the engineering industries. Unfortunately the layman has been given the impression that the technician in industry is something new and the demand for same has not been previously recognized. Such sentiments are, of course, quite unjustified. The laboratory assistant, the draftsman, and other supporting and supervisory staff, some in training, some partly qualified and others holding sub-professional qualifications are part and parcel of all major industries. They may not have always been called technicians, but from the viewpoint of status, perhaps it is a good thing that they should be recognized as such in the future.

I suggest the status of the technician will become clearly defined when they set up their own sub-professional organizations. In the United States, for example, the Institute for the Certification of Engineering Technicians regulates the use and hence the consequent esteem of the title *technician*.

There is, indeed, a need for more technicians, but answers to questions such as "*What is a desirable ratio of technicians to scientists or engineers?*" are very hard, if not impossible to obtain. Figures of 4-6 technicians per engineer and 1½ technicians per scientist have been quoted in the U.K., but the figure will naturally vary with the type of industry concerned.

Technologists

At the professional level there is a demand for the technologist. Here is a man described in the U.K. as "*one who has studied the fundamental principles of his chosen technology and should be able to use his knowledge and experience to initiate practical developments*". He is expected to accept a high degree of responsibility and, in some cases,

to extend the boundaries of knowledge in his own particular field. The technologist in Australia will have qualified for a degree or diploma recognised by an appropriate professional body. A good proportion of these technological graduates and diplomates will be engaged in the work of process and laboratory control, plant design, process development, and, perhaps later in their careers, factory management. Some of them, however, particularly the university graduates who have proceeded to higher degrees, will be engaged in the very vital role of applied research, and I use this term to distinguish it from research of a more general nature, which may or may not have a practical application. We are to have some results of applied research communicated to us later in this programme.

TECHNICIAN TRAINING

Appreciating the demand for technicians, let us turn to technician training which is obviously an important function of the Technical College. Students may be expected to enter courses at the Intermediate or Leaving Certificate level, and to complete a terminal course of training extending over 4 or 5 years of part-time study leading to a Certificate. Commonwealth Scholarships are soon to be awarded for full-time study so that technician training in Australia may, to some extent, parallel that conducted in the United States where full-time courses in Universities, Junior Colleges, and Technical Institutes extend over 2 years, or half the time normally devoted to a University degree.

In view of the practical nature of the technician's work some doubts have been expressed as to the advisability of full time study and there would appear to be certain advantages in training technicians by sandwich courses in which periods of full time study alternate with periods of prescribed industrial training.



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TECHNOLOGIST TRAINING

In Australia

We come now to professional technological training as conducted in Australia. In the past, students have followed the established pattern of diploma and degree work, diplomas being offered by Technical Colleges and degrees by Universities. Many students have followed these courses part time. In contrast with the Universities where matriculation is mandatory, entrance requirements at Technical Colleges have varied widely throughout Australia, and this situation has been criticized. However, the diploma courses have been in vogue for many years and have had wide acceptance. They were replaced by 3-year degree courses in N.S.W. and S.A., but in response to the demands of industry have been recently reintroduced in N.S.W. The diploma curriculum with its emphasis on practice lacks the rigour of its university counterpart. It is, nevertheless, an excellent preparation for those seeking a career in industry.

We should note, incidentally, that the degree is a qualification sufficient unto itself; the diploma, on the other hand, is invariably designed to meet the requirements of professional institutions so that standards are, in fact, set externally.

In the future, with the provision of adequate funds by the Australian Universities Commission, University training may be expected to go from strength to strength with an increasing emphasis on the basic sciences. But what of the future of technological training in the Technical Colleges? It seems that, if we are to be guided by the Martin Report, considerable expansion of facilities is bound to eventuate, but the actual training could remain much as before. A 3-year post matriculation diploma course has been proposed as the basic technological qualification and as there is the laudable suggestion that the new diploma curriculum should include the liberal arts, the technological content may be reduced. The recog-

nition to be accorded to these *new* diplomas is a matter for the professional institutions concerned and we trust that their requirements can be met. There is the interesting possibility that the Bachelor of Technology degree will be available in a foundation in each State for diplomates who complete a further year's study, but the position of the Government on this issue is by no means clear.

Overseas

By comparison, let us look at what has been recently proposed in the United Kingdom with regard to technological education, and to do this effectively we must go back to 1955. That year saw the establishment of the National Council for Technological Awards, an independent self governing body, whose prime function was to assess courses and award diplomas to students who had successfully completed an approved sequence of studies. The Dip. Tech., as it was called, was available in various technologies and regarded as equivalent to a University Honours degree. About the same time 9 leading Technical Colleges were created Colleges of Advanced Technology, the intention being that they would tend to concentrate their activities at Dip. Tech. level. After some 10 years experience, the Dip. Tech., although extremely successful, is to be replaced by a degree following the recommendation of the Robbins Report on Higher Education in the U.K. The Council has also had a change of name and becomes the Council for National Academic Awards. This body, incorporated by Royal Charter, will continue to assess courses offered by Technical Colleges and will award degrees where the appropriate standard has been met. The C.A.T.S. themselves have been transposed into Universities, not of the traditional type, but rather institutions in which technology plays a leading role. These new Technological Universities will, of course, be degree conferring.

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In the light of what has been recommended in the Robbins Report for technological education, you will agree with me that the Australian proposals fall far short of those for the United Kingdom.

CO-ORDINATED TECHNOLOGICAL TRAINING

Having commented upon degree and *new* diploma courses devised for our budding technologists in Australia, and which could fairly be labelled conventional, may I now refer to different types of technological training which I feel merit our serious consideration.

Co-operative and Sandwich Courses

First I will deal with courses in which industrial training forms an integral part of the curriculum — courses, which I might add, are particularly suited to technological institutions. Training along these lines is called Co-operative Education in Canada and the United States. Here students spend alternated periods attending College and working in industry. In this way employers are not inconvenienced when a student returns to College as another one takes his place and carries on with the job. In the United Kingdom a similar procedure has been adopted in the provision of Sandwich Courses leading to the Dip. Tech., previously mentioned. A further variation of the scheme is for students to spend 2 years in College, one year in industry, and then a final year in College. This would be described as a *thick sandwich*. Some attention has already been given to sandwich type courses in Australia.

Now I stress that the industrial training should not be confused with vacation experience (often light-hearted) which some of us enjoyed in the past, or with part-time study, as we know it. The purpose of this industrial training is to illustrate the application of scientific methods to the complex problems of industry. Preferably, the student in industry should be supervised by

an industrial tutor who would normally be a member of the firm with whom the student is employed and concerned with his overall programme of training, and his progress. At the same time those responsible for teaching the student in the College must maintain close contact, and the student's progress must be assessed at various stages during the training period by oral and written examinations. Clearly, the administrative problems cannot be dismissed lightly. Also, heavy demands are made on industries which collaborate on these training programmes. The results, however, are found to be commensurate with the effort involved and students who have completed this course of training are particularly well prepared for careers in technology.

The participation of technological institutions in integrated academic and industrial studies clearly sets them apart from Universities insofar as educational procedures and curricula are concerned. In Australia, I cannot think of a more vital part that our technological institutions have to play than the co-ordination of technological training, and I shall return to this matter later on.

Management/Technology Studies

Having stressed the area of co-ordinated industrial training in which I feel the technological institutions may make a significant contribution to the education of technologists, I will now touch on another — that is, the provision of management/technology courses. In brief, such courses are designed to prepare students for a career in the managerial and commercial side of industry. If, for example, we are to effectively market the products of technology in foreign countries, we must produce technologists who are knowledgeable in business studies and reasonably fluent in one or more languages in addition to English. I realize that this technological hybrid may not be immediately accepted in industry, but I foresee an increasing demand for

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POST-GRADUATE TECHNOLOGY

I now propose to deal with a matter of great importance to those engaged in industry and applied research, and this is post-graduate technology. There are 2 aspects to be considered: one is technological research and development and the other is post-graduate professional technological training.

Technological Research and Development

We are all agreed that one of the important functions of the technologist is to apply scientific *know-how* to industrial problems, as they crop up from day to day. There is, however, another type of technological activity leading to the development of new processes or new techniques which may be called research, but I think development is a better term. Research, incidentally, takes many forms and, by no means, is all of it concerned with advancing the frontiers of scientific knowledge. Sometimes it is a rather pedestrian exercise. Persons engaged in research and development at whatever level should have creative ability and be possessed of an enquiring mind; preferably also, they should have received post-graduate training at an academic institution.

In Australia virtually all post-graduate training is done at Universities. A very different situation now obtains in the United Kingdom where, in addition to Universities, the Council for National Academic Awards, which I mentioned earlier, is empowered to award masters and doctors degrees for applied research work carried out in approved institutions other than Universities. Such institutions may include Technical Colleges, and government and industrial research laboratories. The programme may embrace a wide range of industrial activities such as research, development, design, production or market investigation. An essential feature of the post graduate curriculum is its flexibility in that

the major part of the work may be done in industry or in a College. Thus a post-graduate degree in the United Kingdom will no longer signify an association with a University research school; in fact, it will become a measure of academic attainment alone.

In the United Kingdom therefore there will be two types of persons coming forward with post-graduate qualifications, namely, those who have followed a traditional University course with its emphasis on scholarship and research and those who have pursued a course of co-ordinated academic and industrial training at a technological institution, followed by a programme of industrial research or development.

Now in Australia I foresee an ever increasing demand for new processes and new products. We already have the University researcher with his increasing preoccupation with the fundamental sciences; but I suggest there is also an urgent need for his industrial counterpart with his orientation towards the applied sciences.

Higher Professional Technological Training

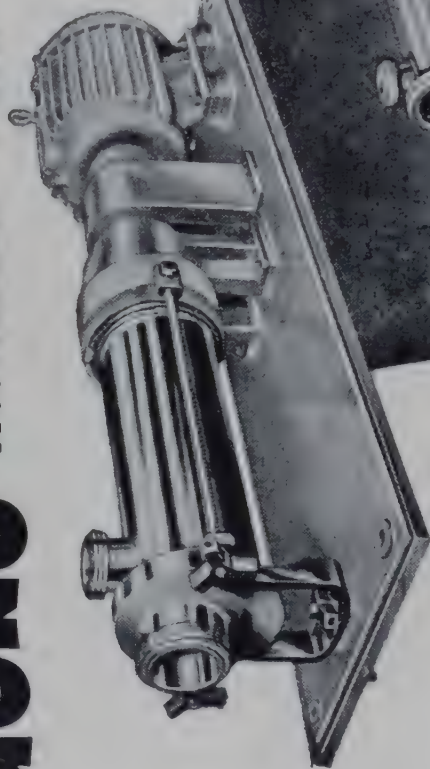
The other aspect of post-graduate technology, i.e. higher professional technological training, is important because it is no longer possible to complete ones training in a 3-year or 4-year post matriculation course. Knowledge is advancing too rapidly. The need therefore arises for professional post-graduate training, *not* in research, but to a greater depth in a chosen technological field. Such courses are commonplace in the United States and already in evidence in Australia. As time goes on, we would hope to see more post-graduate diplomas and more master degrees being offered for purely formal advanced studies in technology.

THE FUTURE INSTITUTE OF TECHNOLOGY IN AUSTRALIA

Finally I would like to comment on the possible future development of Institutes of Technology in Australia as foreshadowed in the Mar-

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tin Report, and to say a few words about the staff and students of same. My remarks here are, of course, speculative and perfectly general.

I assume, at the outset, that the Technical Colleges will continue with their technician and technologist training at certificate and diploma level. On this basis I see the future Institutes of Technology limiting the scope of their activities to diploma and degree work and also providing courses for those desirous of undertaking further studies after graduation. The future Institutes of Technology would maintain an effective liaison with government and industry by reason of co-ordinated academic and industrial training, to which I have referred, and by the interchange of Institute and industrial staff. Institute staff might be seconded, if required, to work on industrial problems and industrial staff could participate in Institute teaching to a far greater extent than at present practised.

The permanent staff of the Institutes should hold well recognized academic qualifications and have gained appropriate experience in industry. They should be persons to whom industry turns for advice. I do not subscribe to the argument that university graduates, bent on teaching but who do not aspire to university posts, would naturally gravitate to Institutes of Technology. Students in such Institutes are best taught by those who have distinguished themselves in both the academic and industrial spheres.

If they are to make their mark in industry at a later stage, the students of the future Institutes of Technology should be those who have obtained a good scholastic record at school. They would comprise that body of the student community who have elected to undertake a course of training which is quite different from that offered at a University, but which provides an alternative route to professional status.

At this stage it would be remiss of me if I failed to pay tribute to the developments in technological education which have occurred in this State over the last 10 years. We have in South Australia an excellent working arrangement whereby students of the S.A. Institute of Technology undertake the whole of their training in the Institute but are awarded the degrees B. Tech., B. App. Sc., and B. Pharm. of the University of Adelaide. The responsibility for the various courses rests with a joint faculty. With its provision of diplomas and degrees the S.A. Institute of Technology has perhaps already anticipated many of the recommendations of the Martin Report. In this respect an inspiring lead has been given to other technological institutions in Australia whose responsibilities must increase markedly with the rapid growth of non-University tertiary education.

CONCLUSIONS

In closing, I return to the title of my address — *"Technological Education — a Decision for Australia"*. I have drawn attention to a number of areas in which I believe vital issues are at stake. These are technician training, technologist training, co-ordinated training with industry, and post-graduate technology. We have received a mandate to proceed with the expansion of non-University tertiary education. Let us hope it also becomes a renaissance in technological education. As individuals and members of corporate bodies I am sure you are well able to make your decisions regarding the pattern which this overall expansion should take and voice them in the right quarters.

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SUMMARY OF PAPERS

THE USE OF SULPHUR DIOXIDE IN THE DRIED TREE FRUIT INDUSTRY

By D. McG. McBEAN,

Division of Food Preservation, C.S.I.R.O., Ryde, N.S.W.

Sulphur dioxide is used in dried tree fruits mainly to retard *browning* and thus lengthen the time during which the commodity remains saleable. The amount of preservative permitted is subject to legal limitation.

Existing commercial sulphuring practices are many and varied in Australia, causing wide differences in the sulphur dioxide level in dried fruits. A study of the uptake and desorption of gaseous sulphur dioxide by fruit tissue under controlled

laboratory conditions has evaluated those factors which are of practical importance and indicated how some measure of control may be applied in the industry.

Further experiments suggest ways by which sulphur dioxide penetrates tissue during sulphuring and desorbs during drying. The relative amounts of sulphur dioxide present in the *free* and combined forms, at various stages of processing, was also studied.

THE CHEMICAL REACTIONS OF SULPHUR DIOXIDE IN FOODS

By Dr. D. L. INGLES,

Division of Food Preservation, C.S.I.R.O., Ryde, N.S.W.

Sulphur dioxide is added to foods to inhibit non-enzymic browning reactions. To find how sulphur dioxide inhibits such browning reactions and to determine the fate of the sulphur dioxide added to a food, studies were made of the reactions of sulphur dioxide with sugars. At least five different reactions are now known.

Formation of bisulphite addition compounds;

Disproportionation of sulphur dioxide to sulphate and sulphur;
Oxidation of sugars;
Sulphation;
Sulphonation.

These reactions and their relation to the use of sulphur dioxide in foods were discussed and preliminary work directed toward the preparation of new and improved inhibitors of non-enzymic browning were considered.

SULPHUR DIOXIDE IN WINEMAKING

By B. C. RANKINE,

The Australian Wine Research Institute, Adelaide.

Sulphur dioxide is of basic importance in winemaking, and its rational use in recent years has led to a great improvement in wine quality.

Sulphur dioxide exists in wine in the free form, comprising undissociated sulphur dioxide, bisulphite and sulphite ions, the relative proportions of which are pH dependent and all are directly titratable by iodine. It also exists bound to aldehydes, ketones, sugars, tannins and other compounds. The proportion of free to bound sulphur dioxide at

any one time depends on wine composition and temperature.

Sulphur dioxide is added before and after fermentation and the winemaker endeavours to maintain a high proportion of free to bound sulphur dioxide, since this is the form which has the greatest antioxidant and antiseptic action.

The desirable level of free sulphur dioxide depends on the type of wine, with less required in red table wines and dry sherry than in white table wines. Dessert wines require less than sweet table wines, due to their higher alcohol content.

SALMONELLOSIS IN AUSTRALIA

By Miss NANCY ATKINSON,

Department of Microbiology, University of Adelaide.

In a survey of *Salmonella* infections in Australia 123 different serotypes were responsible for diseases in man or animals or were found in various foodstuffs, water samples or fertilizers. The occurrence of human salmonellosis over the last ten years was reviewed and showed that the commonest cause was *S. typhimurium*. Other important types were *S. bovis-morbificans*, *S. derby*, *S. newport* and *S. adelaide*. Rather than decreasing, salmonellosis appears to be increasing in the later years. With more cases and carriers, the *Salmonella* load of sewage must have increased, with consequent increase in likelihood of

contamination of sea water, oyster beds, river water and the like. The likelihood of carriers working in the food industry has also increased.

Animal salmonellosis is common and farm animals may contaminate their environment and lead to infections of humans through handling meat, milk, etc., or to water pollution, especially if grazing on a water-shed. Abattoirs effluents may also contain *Salmonellas* from sick or carrier animals.

Other materials acting as vehicles of infection for man and animals were fertilizer and animal feeding stuffs of animal origin, coconut and egg pulp.

NOTES ON BEER FLAVOUR MEASUREMENT

By N. H. POPE and J. V. HARVEY,

S.A. Brewing Co. Ltd., Adelaide.

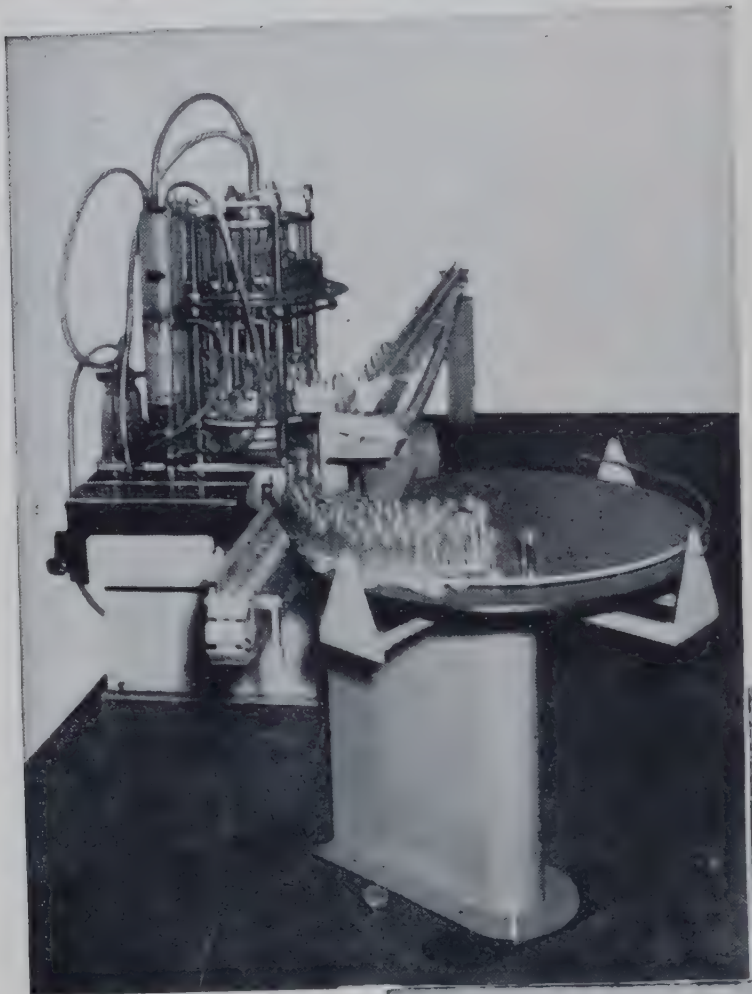
The principal flavour constituents of beer were discussed and methods for their measurement described. Particular mention was made of the use of gas liquid chromatography for the measurement of esters, aldehydes and ketones in beers and stouts, employing a method which

utilizes sampling of the headspace gases.

The measurement and effect of the hop components, hydrogen sulphide, mercaptans and fusel oils, diacetyl and other components was also discussed and some methods of taste testing described briefly.

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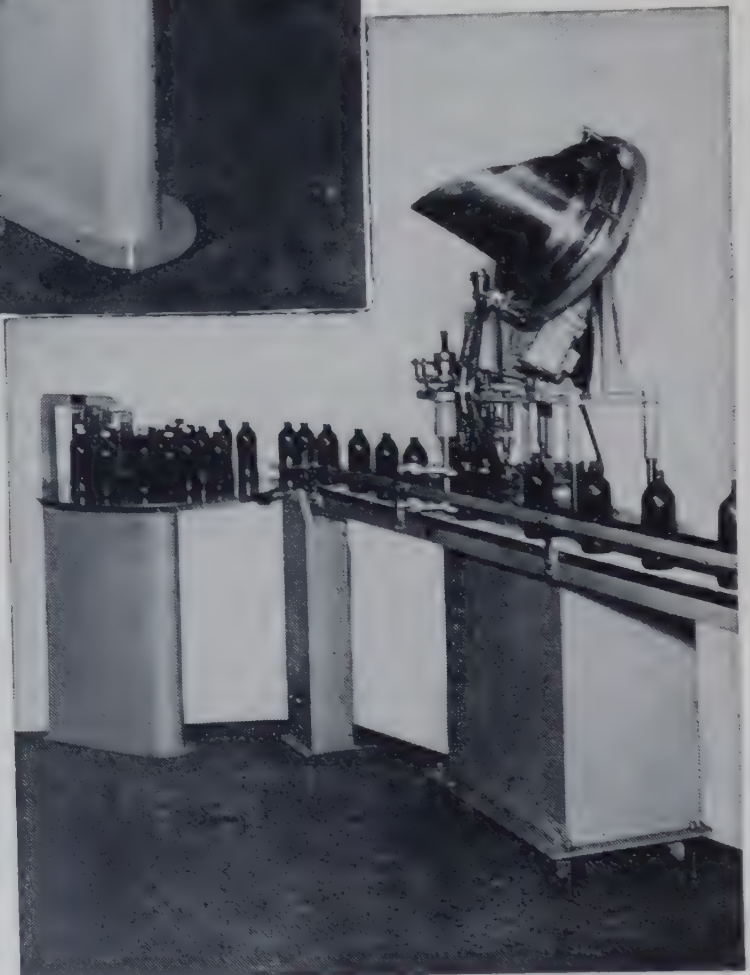
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PROTEINS IN THE DEVELOPING WHEAT GRAIN

By A. C. JENNINGS,
Waite Agricultural Research Institute, University of Adelaide

A comprehensive study of the proteins in the immature wheat endosperm has been made at the Waite Institute over the past 7 years in an endeavour to elucidate the mode of synthesis, the form of storage and the nature of the proteins present in wheat flour.

Extraction of the immature endosperm with aqueous solvents and subsequent fractionation showed that qualitatively the same proteins occurred in immature endosperm as in flour but that during growth the proportions of the proteins present changed markedly. Cytological studies showed the presence of dense, osmophilic bodies within an enclosing membrane structure in the

wheat endosperm which increased in size and number during growth. These bodies and organelles were subsequently isolated and shown to be the site of synthesis and storage of the gluten proteins.

It was also found that the intact organelles were self-sufficient as far as protein synthesis was concerned, containing transfer-ribonucleic acid and ribosomes and the necessary enzymes and system for the production of reactive phosphoryl groups and that the gluten proteins are synthesized only within these organelles and independently of protein synthesis in the cytoplasm of the endosperm cell.

WINE IN CANS

By L. J. WHELAN,
Containers Ltd., Melbourne

A discussion of the difficulties encountered in and the prospects of canning of wines currently produced by wine growers in Australia, with reference to information available from overseas. The shelf life re-

quirements of canned wines were discussed in relation to the factors influencing them, which are either inherent in the product or arise from the nature of the wine market.

STUDIES OF MALTING BEHAVIOUR IN BARLEY

By D. H. B. SPARROW,
Waite Agricultural Research Institute, University of Adelaide

Research over the past decade both at the Waite Agricultural Research Institute and elsewhere has led to a better understanding of the mechanism of barley germination.

It is possible to distinguish two phases in germination. First, water activates the embryo to release a gibberellin which travels to the aleurone layer to initiate phase two, the release of enzymes into the endosperm with the consequent modification of the latter to soluble sugars and amino acids, used by the embryo for growth.

Gibberellic acid was already in

use as a malting adjunct to speed up natural modification before the true role of natural gibberellin had been elucidated. In 1960, Yomo in Japan and Paleg at the Waite Institute, independently demonstrated that simple sugars were released from half grains of barley lacking an embryo but treated with gibberellic acid. This led to the hypothesis that grain from which the embryo had been removed or inactivated could be malted if treated with gibberellic acid.

The present author has recently published a paper showing that this



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is possible. In commercial malting embryo removal is not feasible but a number of methods of embryo inactivation have been described in-

cluding acid treatment, hot water steeping and grain crushing. Some aspects of these modified malting methods were discussed.

NEW IDEAS ON FLAVOUR

By DAVID A. FORSS,

Division of Dairy Research, C.S.I.R.O., Highett, Vic.

Flavour is one of the most important factors in determining whether a food is attractive and hence whether it sells well.

Preservation of the natural flavour may be the prime consideration in processing and if concentration is carried out special procedures may be necessary. The incorporation of synthetic flavour compounds may be desirable. Understanding of the formation of off-flavours makes their prevention easier. The sterilization and pasteurization by gamma radiation of certain foods is now commercially feasible. Toxic flavour compounds may occur or be produced in foods. Many desirable flavours are only formed during processing.

Many volatile compounds have been isolated from foods but their role has often not been evaluated. Their flavour is influenced by their physical and chemical environment and depends on the medium and the presence of compounds which may act synergistically with these volatile compounds. Amoore's stereochemical theory of odour is worthy of consideration in relation to such flavour problems.

New laboratory instruments and techniques have made possible more rapid methods of flavour analysis, the examination of smaller samples, the study of a wider boiling range of compounds, quantitative analyses and the avoidance or minimization of artefacts due to the use of organic solvents.

THE AUSTRALIAN EXPORT MEAT INDUSTRY

By P. J. ANDERSON,

Metropolitan Wholesale Meat Co., Adelaide

An outline of the Australian export meat industry today, its growth during recent years and its activities in both traditional and new markets in some of the world's developing countries.

Australia today is facing a period of unparalleled opportunity for the expansion of meat exports in view of the redistribution of markets which has occurred in the last twelve months as well as the continuance of trade with our established markets in the United Kingdom and North America.

The U.S.A. market, to which Australia has been the largest supplier of Beef for some years, is naturally of prime importance to this country, and recent legislation passed by

the United States government restricting imports of Beef, Veal and Mutton from all sources could have a serious effect on our trade with the U.S. On the other hand, the United Kingdom has been looking to fresh sources of supply, especially Australia and New Zealand, to provide frozen Beef following a reduction in supplies from the Argentine. Beef consumption on the Continent is also steadily increasing.

With the world demand for meat steadily on the incline, Australia can look forward to a bright future in meat exports, but world markets are strongly competitive, and the Australian industry must make every effort to maintain and, if possible, strengthen its position.



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EXPORT REGULATIONS

By J. D. MacFARLANE,
Department of Primary Industry, Canberra, A.C.T.

The Export Inspection Services of the Commonwealth Department of Primary Industry are concerned with the administration of legislation imposing compulsory conditions and restrictions on the export of most of the foodstuffs produced in Australia for export. Commonwealth legislation in this field dates back to 1905 when the Commonwealth Parliament passed the Commerce (Trade Descriptions) Act.

As the primary industries developed to a stage where surpluses were produced over and above domestic requirements, producers were forced to look to overseas markets to absorb increasing proportions of output. In the early stages of the Australian export trade our primary products gained some notoriety as being fairly consistently bad and very variable. Consequently the Government of the day imposed compulsory export standards for the principal products in order to correct this situation and to establish a continuing demand for Australian foodstuffs overseas.

Within the provisions of the Customs Act, comprehensive regulations have been made in which the conditions and restrictions applicable to each of the products which are subject to inspection are set out

in detail. The regulations have common features which, within the general framework, provide that export is prohibited unless the goods have been:—

- Prepared in approved premises;
- Comply with standards of quality and,
- Bear the prescribed markings.

The Department of Primary Industry employs a staff of professional and technical officers in excess of one thousand to undertake the inspection or grading of export products.

The final act in the inspection procedures is the certification of the goods. Health certificates are issued for some products and certificates of condition or grade certificates for others. These certificates facilitate trade by providing independent evidence of the quality of the goods and in some cases provide the means by which entry of the goods into the overseas country can be assured.

With the world-wide developments in food technology, importing countries are demanding more uniform standards and much wider certification. For this reason, the Department of Primary Industry has found it necessary continually to review prescribed standards, inspection procedures and certification.

TUNA IN SOUTHERN AUSTRALIAN WATERS

By Dr. G. L. KESTEVEN,
Division of Fisheries & Oceanography, C.S.I.R.O., Cronulla, N.S.W.

The address dealt with the distribution and abundance of southern bluefin tuna in South Australian waters and with the status and prospects for the fishery. It described the patterns of distribution of tuna in Australian waters, relating these patterns to seasons and to features of the tuna life-cycle. It then discussed some evidence on the composition of the stock(s) of this

species and on abundance. Some account was given of the methods employed in the scientific investigations carried out, with special reference to the order of accuracy of the results obtained and obtainable. The value of such results for planning industrial development (in both primary and secondary sector) and for conduct of operations was considered.

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STARCH MAKING IN VENEZUELA

By Dr. WERNER M. HONSCH,
Adelaide.

Starch production in Venezuela is mainly based on the native yuca (*manihot utillissima*) known also as manioc or tapioca. Yuca is grown by peasants as a source of carbohydrates for animal and human consumption since centuries in tropical South America, but large scale plantations have been attempted first a few years ago, when modern starch plants were installed.

Central Yuquero El Pao C.A. with headquarters in Valencia grows its own yuca on the northern slopes of

the Andes near Lake Maracaibo and has interests in plantations on the southern slopes in the Barinas. Planting and harvesting of yuca in these regions was shown. Starch plants of modern design are situated at El Pao, about 100 miles south, and at Agua Viva, about 350 miles west of Valencia. Operations of these plants was shown and explained with the view of raising an interest in this kind of starch production in northern New South Wales and Queensland.

STRUCTURE AND CORROSION OF TINPLATE

By P. W. BOARD,
Division of Food Preservation, C.S.I.R.O., Ryde, N.S.W.

Although tinplate has been used for packaging foods for many years it is only in the last few years that a clear understanding of many important aspects of its structure and corrosion properties have been elucidated. In his paper the author introduced some of the basic electrochemical techniques used in studying corrosion processes and then described how these techniques are applied to practical problems of corrosion of unlacquered tinplate by foods.

The tin-iron alloy which lies between the steel base plate and the

tin coating was described and its role in corrosion processes discussed. The evidence for the existence of an additional layer of unknown composition between the alloy and the steel was reviewed.

The paper concluded with reference to current investigations of unusually fast detinning in plain cans of beans, spinach and tomatoes, and of corrosion reactions leading to discoloration of canned meats. Problems arising from the use of polyphosphates in canned meats were also described.

MILK POWDERS AND OTHER MILK PROTEINS AVAILABLE FOR USE IN FOODS

By R. A. BUCHANAN,
Division of Dairy Research, C.S.I.R.O., Highett, Vic.

SKIM MILK POWDERS

Different heat treatments will affect many of the properties of milk powders such as nutritive value;

colour development in baked goods; loaf volume in bread; flavour defects; viscosity, solubility and dispersibility.

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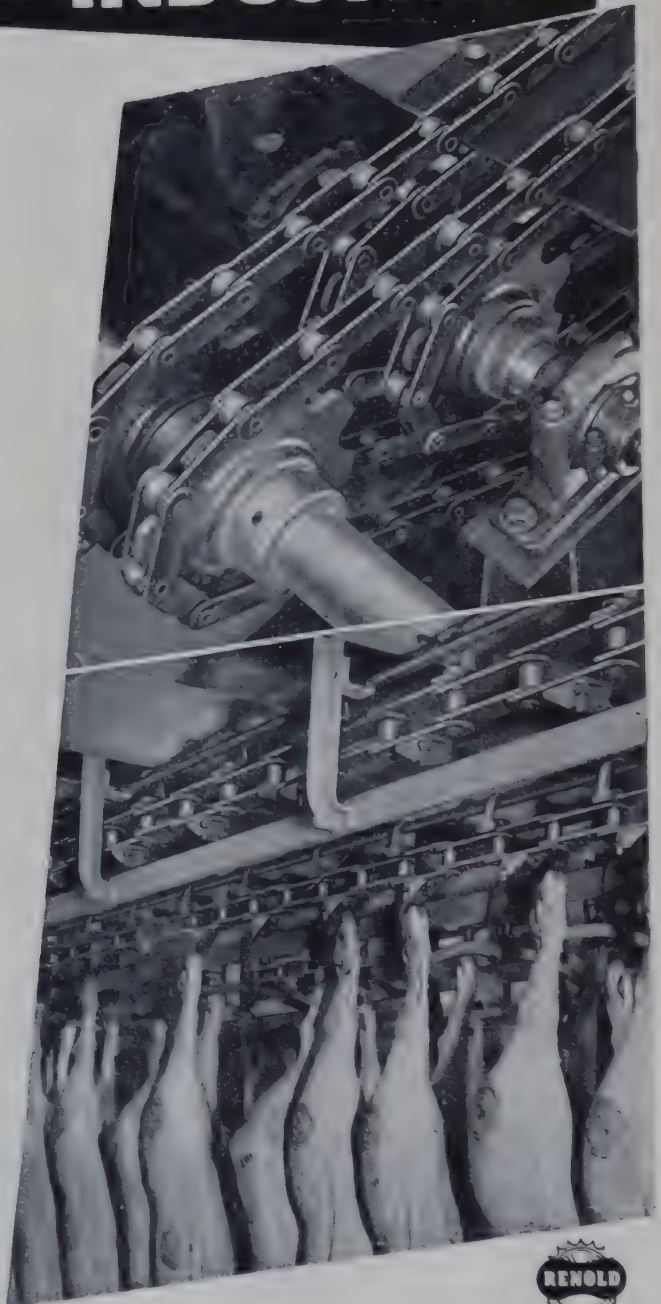
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The whey-protein-nitrogen index is a guide but not an infallible record of the extent of heat treatment.

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CASEINS

Lactic, hydrochloric and sulphuric caseins contain approximately 85 per cent protein but are not water soluble. Sodium caseinate contains approximately 87 per cent protein, is water soluble and is used as a source of protein in meat products, cake mixes and special diet foods. In the U.S.A. it is used in breakfast cereals and coffee creaming powders, too.

One modified caseinate is dried with added salt for ready incorporation in meat packs. Another is dried with added sugar for ease of solubility, particularly in cake mixes. A sodium caseinate with a more oven-stable foam may be available shortly.

Hydrolyzed casein is used extensively as a substitute for soy sauce and as a flavour enhancer in meat products.

CO-PRECIPITATE

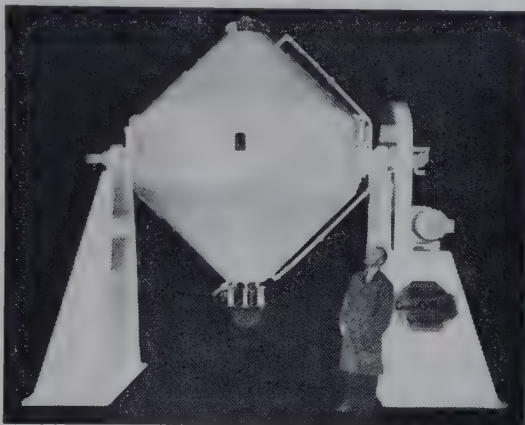
We have recently produced a new 80 per cent protein product which contains 97 per cent of the proteins in milk instead of just the casein as in commercial caseinates. It is available in a granular form or as a spray dried powder. It appears to be suitable for use in meat products, bread, and as a general substitute for sodium caseinate in a wide range of special foods.

LARGE CONE BLENDER

One of the world's largest double cone blender-dryers, the Cone-O-Blend, has been manufactured in Australia by Toledo Engineering Pty. Ltd., for a Food Company in Sydney.

The Cone-O-Blend has a volume capacity of 300 cubic feet with a working capacity of 200 cubic feet, equivalent to 2 tons of mixture.

The vessel is a double cone, which is jacket steam heated. The inner vessel can be evacuated, and all parts brought into contact with the product are of stainless steel. The whole chamber rotates, and is suspended on heavy duty bearings, sup-



CONE-O-BLEND

ported on steel plinths, and powered by an electric motor geared to provide an infinitely variable speed range for rotating the drying chamber.

The approximate dimensions of the Toledo Cone-O-Blend Blender-Dryer are:—

Height, 13 ft 0 in.; Width at base, 15 ft 0 in., Chamber height, 10 ft 0 in., Cone diameter, 9 ft 0 in., Swing 5 ft 6 in., Empty weight, 6 ton, Loaded weight, 8 ton.

The Dryer will be used in the manufacture of dehydrated food products. Loading and unloading takes ten minutes, the product being discharged through an adjustable gate which prevents spillage and dusting.

Food Technology in Europe

(Continued from Vol. 17, No. 6, page 322)

DAIRY PRODUCTS

The session dealing with Dairy Products was presided over by Dr. J. G. Davis and four papers were presented:—

CONDENSED MILKS, by Dr. P. Borgeaud, Afico S.A., Vaud, Switzerland.

The term concentrated milk includes: (1) the unsweetened variety — evaporated and concentrated milks of total solids 26-33 per cent; (2) the sweetened condensed milks of total solids 29-35 per cent and sugar between 40-44 per cent. The technology of these milks is associated with the problems of their stability during sterilization, gel formation during storage and efforts to make it resemble fresh milk in colour and taste. Improved equipment now permits faster processing and a selection of preheating conditions helps to prevent thickening and gel formation during storage. In sweetened condensed milk the thickening is progressive and can be gauged by accelerated storage tests. For unsweetened condensed milk, however, there is no rapid test to detect the tendency to thicken or form a gel. Improvements in colour and taste can be obtained by H.T.S.T. techniques for sterilizing and pre-heating.

Recent research has increased the knowledge of the physico-chemical changes in milk proteins and the effect of electrolytes. Polyphosphates have been shown to increase the storage life of H.T.S.T. sterilized milk but with sweetened condensed milk the effect is variable, small quantities are beneficial but excess is detrimental.

Interesting developments have taken place in the range of heat and mechanical treatments of milk

so that now almost any desired set of conditions can be applied together with progress in the field of continuous and automated processes.

Double and triple effect evaporators have replaced single effect pans and these newer evaporators might lead to a different state in the physico-chemical condition of the proteins with a corresponding effect on initial viscosity and the tendency to thicken. More research will help resolve these points.

Continuous pressure sterilizers have mainly replaced the small batch sterilizers. Hydrostatic and hot air sterilizers have recently been introduced, but the hydrostatic ones are less flexible with regard to time and temperature than the continuous pressure sterilizers. The hot air sterilizers allow a combination of time and temperature but the drawback is that the internal pressure in the tin cannot be compensated by an external pressure and so the size of tin that can be processed in this way is limited.

Aseptic filling after H.T.S.T. treatment has been confined mainly to liquid milk filling as the stability of concentrated milk against gelling has not been fully worked out.

DRIED MILK, by H. Torrsell, Västsvenska Mejeriernas Centralförbund, Vänesborg, Sweden.

In some European countries there are official bacteriological standards for dried milk and in order to meet these standards some form of H.T.S.T. sterilization of the milk has been necessary. Various falling film evaporators with a low liquid hold up and single pass operations have been developed as well as steam injection systems. The new Bactofuge system is a valuable tool as it does not employ excessive heat, is especially efficient in removing

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spores and does not impair the taste of the product.

The low liquid hold up in modern evaporators has made it possible to concentrate the milk more than previously, thus saving fuel. Common values for skim milk are 48 per cent solids and for whole milk 52 per cent. Spray drying thermal efficiency is greatly improved by increased inlet air temperature. Temperatures of 260°C (500°F) are now common. There is, however, a tendency to use somewhat lower inlet air temperatures 190°C (370°F) when drying whole milk.

Spray dryers have greatly improved over the last few years with conical bottoms so arranged to take out the greater part of the powder directly from the chamber, while the introduction of air brooms and pneumatic air locks allow the drying of very high fat powders without difficulty.

Roller dryers of the Just-Hat-maker type have been used for nearly half a century and double drum dryers are now available which will handle milk concentrates of almost twice the usual solids content. In some types the milk concentrate is sprayed on to the rollers, instead of adding the milk as a film from a trough.

Instant powders are becoming of increasing importance. Several *instantizers* are available, by which ordinary powder is converted into instant forms and some types are available which allow for continuous operation. The instant powders made according to the rewetting processes usually have very low bulk density, roughly half that of ordinary powders. Instant powders made by the straight through processes have a bulk density only slightly below normal. The *instancy* is a combined concept of wettability, dispersibility and solubility and is somewhat less pronounced for straight through powders than for rewetted powders. Powders of the *instant* type are freer flowing and form less dust than ordinary powders and improvements in these

ways should benefit all food manufacturers using milk powders.

LIQUID MILK, by Drs. T. R. Ashton and J. G. Davis, J. G. Davis & Partners.

The most recent advances in the technology of liquid milk have been concerned with new methods of heat treatment, packaging in paper and plastic containers and aseptic filling. In the production of sterile milk various methods have been investigated — indirect heating by steam in tubular or plate forms of equipment or direct heating with the steam being injected into the product or the product injected into the steam. These ultra high temperature systems (U.H.T.) consist of heating the milk to 275°-300°F for 1-2 seconds, followed by rapid cooling. At some stage in any U.H.T. system the milk must be homogenised to ensure even distribution of butterfat and if carried out after heating may help delay gelation when the milk is aged.

Progress has been made in aseptic filling and two systems are commercially available. The Dole system is an aseptic canning unit, preferably using aluminium or aluminium alloys, where superheated steam is used to sterilize the machine and maintain a sterile atmosphere throughout the filling operation. The Tetra-Pak system where semi-bleached reinforced paper with a polythene-coated interior surface and a wax coating on the exterior is formed into tetrahedral shaped containers and the paper is sterilized by passing through a bath of hydrogen peroxide.

Other recent important developments in liquid milk technology are in bulk milk collection, clarification, bactofugation, freezing and packaging.

Considerable progress has been made in the carton field in the last decade and of special interest are the orthodox cartons — Purepak, Zupak and Blockpak, and the unorthodox Tetra-Pak.

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In recent years the *light-weight* glass bottle has been introduced weighing 14-15 oz. compared with 17-18 oz. standard and work is in progress to make the bottles more resistant to impact and thermal shock. Plastic bottles have also been tried, weighing only about 2 oz. As yet, they are expensive and also difficult to handle because they are so light and high capacity filling machines have yet to be developed.

CHEESE, by P. Tiersma, Ministry of Agriculture and Fisheries, Arnhem, Netherlands.

Cheese of high quality is not merely a product of processing of milk but environmental factors play an important role in the type and character of the final product.

In all the traditional systems the process is discontinuous, and only highly skilled workers can maintain the required quality. Progress in the field of scientific understanding and control of processes, more equipment and more detailed knowledge have made it possible to bring the so-called *environmental* effects under control.

The basis of cheesemaking is milk of suitable quality. Excessive mechanical treatment of the milk may cause damage to the fat globules and the colloidal casein system and make the milk less suitable for cheesemaking. Residues of antibiotics, chlorine, pesticides, etc., are also important and steps should be taken to remove them. Prolonged storage at low temperature may alter the clotting ability of the milk. For large-scale industrial processing pasteurization at 70°-72°C for 10-20 seconds in a plate pasteurizer helps to avoid variations in quality.

The starter plays an important role with different approaches according to the type of cheese and the need for constant activity has led to the use of starter consisting of carefully cultured single strains of lactic acid bacteria. Developments have taken place in the mechanical cutting and treatment of the

curd in the vat, drainage of the curd and the formation of curd blocks. Also some simplification has been realized in the moulding and pressing of cheeses. A continuous system of curd-making has recently been developed and opened up the possibility of automation of this part of the process.

In a highly mechanized factory the tendency is to concentrate on only a few cheese types and sizes and to use the factory to capacity as far as possible all the year round.

DISCUSSION

Mr. F. C. Lewis asked whether homogenization was essential with the U.H.T. process? Dr. Ashton replied that it was necessary to keep a positive pressure in the final heating section where the temperature is below 275°-300°F; alternatively a high pressure pump or pumps would have to be used. De-aeration had the advantage of lessening the extent of *burn on* and lengthening the runs possible.

Mr. McLachlan commented that the injection of steam and its removal during processing is illegal in this country. What is the position on the Continent, and if this process has been used, how are we to know if we import such milk? Dr. Ashton agreed that in this country it was illegal to use the direct steam injection method but on the Continent this was not so. If steam of high quality is used and the water content of the milk returned to its original amount, it is acceptable to the consumer. Our methods are lagging behind the Continent in this respect and impeding progress with the sale of plant. We should carry out experiments to satisfy others that there is no disadvantage compared with the indirect methods. It would be difficult to know if imported milk had been treated in such a manner.

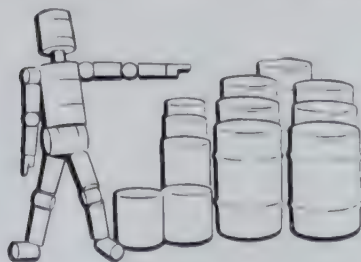
Mr. R. J. Motz referred to the possible addition of polyphosphates as stabilizers to condensed milk, and wondered whether we were sure they were quite harmless. We inject

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considerable quantities into all types of food such as sausages, other meat products, soft drinks and baking powders, to name only a few.

Dr. Pilnik commented that the use of phosphates in milk was illegal in Switzerland. He asked how Birs or Foam Mat dried milk powders compared with ordinary milk powders? Was the *stable smell* inherent in milk, or really an odour picked up from stable atmosphere? Dr. H. Torrsell in reply, said, stable and off-flavours occurring in milk were likely to be at least to some degree retained in Birs powder if no concentration under vacuum had preceded the drying.

Mr. Cakebread commented on Dr. Torrsell's suggestion of combining bactofugation with low temperature treatment and asked was it not likely to lead to the production of dried milk of high lipase activity? Dr. H. Torrsell replied that the influence of bactofugation on lipase content of dried milks had yet to be determined. It was not known, as yet, when bactofugation should be applied, before or after pasteurization. Tests on these problems were, however, to be started shortly.

— Concluded

Personal . . .

Mr. Frank Carter, Technical Secretary, F.T.A. of Queensland, has left for a six months visit overseas. Whilst he is away his position will be filled by Mr. R. Leverington, Food Technologist, Department of Primary Industries, Food Preservation Research Laboratory, Brisbane.

Mr. M. B. Smith of the C.S.I.R.O., Division of Food Preservation recently visited the United States, Britain and Europe where he visited research centres concerned with the physical chemistry of proteins. He was away for about seven weeks.

Miss J. M. Bain of the C.S.I.R.O., Division of Food Preservation has been awarded the degree of Ph.D. by the University of Sydney for re-

search on the physiology of ageing in plant tissues.

Dr. P. M. Linklater has been promoted to Senior Lecturer in the Department of Food Technology, School of Chemical Engineering, The University of N.S.W., Sydney.

FOOD ADDITIVES SYMPOSIUM

A symposium entitled "*Problems of Additives in Foods*" was held in the Union of The University of New South Wales on Tuesday, 20th April. This function was organized by students of the University of N.S.W. Food Science Association, and was the second symposium to be held by the group.

Speakers were: Professor S. E. Wright of the Department of Pharmacy, Sydney University, who discussed "*The W.H.O. Approach to the Problems of Food Additives*"; Mr. J. G. Krigsman of Albright and Wilson, who spoke on "*The Use of Phosphates in the Food Industry*"; and Professor F. H. Reuter of the Department of Food Technology, University of N.S.W., who spoke on "*The Problems of Additives in Irradiated Foods*".

MEAT RADIATION

Although the meat radiation process is not suitable for large cuts of meat, it holds more scope than freezing and is more economical, said Dr. M. Ingram, Director of the newly-formed British Meat Research Institute, on a recent visit to New Zealand.

The capital cost of a plant to sterilize meat through radiation would be about £200,000, he said, "*we calculate that at least 10,000 tons a year is needed for a plant to become economic*".

In America, the Internal Revenue Service has decreed that distilled spirits may be packaged and shipped in certain drums with polyethylene liners.



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BOOK REVIEWS

- "ANALYTICAL METHODS FOR PESTICIDES, PLANT GROWTH REGULATORS, AND FOOD ADDITIVES. Volume IV. — HERBICIDES", by GUNTER ZWEIG (Ed.). 269 pages. Academic Press, New York and London, 1964. \$12.00.

Publication of this book completes a valuable four volume treatise, edited by an acknowledged authority in the field. Methods are given for the determination of 29 of the most commonly used herbicides, both in formulations and as crop residues. Authors are drawn principally from manufacturers of the chemicals involved, and the text is well set out, lucid and amply illustrated with diagrams and standard curves. Although uniformity of presentation has been followed quite closely, some slight discrepancies are noted, particularly in the varying interpretation of what is meant by the *principle* of a method; in some cases, for example, one has to study the detailed procedure to find out what type of cleanup is used.

The book will be of great value to those engaged in checking formulations and residues on crops treated with a known material, but will be limited for use as a means of identification and estimation of unknown compounds, since the question of interference by other pesticides is not fully covered. A chapter on screening tests would be welcomed in any future edition.

The praiseworthy idea of including several related chemicals in one chapter has not been fully exploited. 2,4-D, *silvex* and 2,4,5-trichlorophenoxyacetic acid, for instance, could easily have been treated in this way.

In addition to analytical data, general information for individual compounds is included — empirical formulae, alternative names, source of

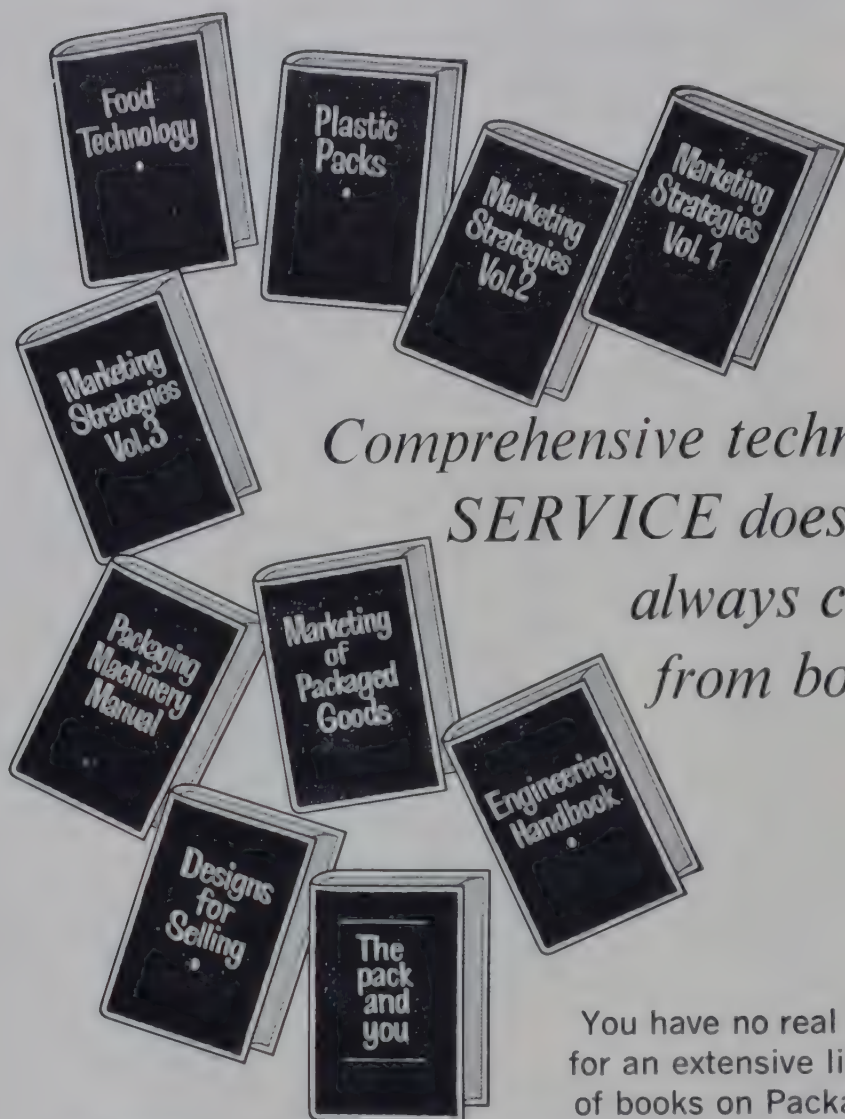
analytical standards, biological properties, history of discovery and use, physical and chemical properties and usual formulations. Unfortunately the data on animal toxicity is often incomplete and virtually devoid of references. The chronic effect of amitrole as a goitrogen, for instance, is not mentioned. Listing of acceptable residue tolerances would also be advantageous.

The book has up to date references and an extensive index. It is recommended to all workers in this field as a welcome addition to the few available texts.

Reviewer: R. C. Stanhope, Food Technologist and Senior Chemist, Department of Health, Victoria.

- "THE OXFAM STORY": A brief account of the Oxford Committee for Famine Relief and the work it has been able to accomplish, by T. R. MILFORD, C. J. COLE, L. O. SWAIN and H. L. KIRKLEY. 76 pages. Pergamon Press, Oxford; The MacMillan Co., New York. 1964. 2s. 6d.

This is the story of the organization which originated in Oxford in 1940 to relieve famine and sickness arising as a result of war. In 1949 its objects became the relief of suffering as a result of wars or other causes in any part of the world. The booklet traces the story of OXFAM until 1964 when it operated on a £2 million budget. The interest to food technologists lies in the work this organization does in disaster feeding and the provision of supplementary foods for the needy and aged in *foreign places*. This points to the need to develop the kinds of food which these situations demand. These are not the foods we



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from books.*

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eat, nor necessarily the foods customary to those receiving help, but new foods that are still to be developed by food technologists. The question has often been put, but no answer found.

This brochure points to the need for them without trying to make a point of the issue.

Reviewer: Professor F. H. Reuter, The University of New South Wales, Sydney.

- ● "MECHANISMS OF OXIDATION OF ORGANIC COMPOUNDS", by W. A. WATERS. 152 pages, Methuen & Co. Ltd., London, John Wiley & Sons, Inc., New York. 1964. £1.5.0.

Dr. Waters is well known for his studies in the field of organic reaction mechanisms, and especially for his contributions on oxidation processes. In this, a concise survey of a broad field, which has developed rapidly during the last two decades, the author has presented a systematic account of the mechanisms of a wide range of general and specific oxidants, in relation to the substrates involved.

Prior to the discussion of oxidation mechanisms for various classes of organic compounds (Chapters 4-9), the author gives a brief account of the electronic nature of oxidation. This account is followed by discussion of the direct oxidation of the C-H bond, including autoxidation, and of the chemistry of organic peroxides (Chapters 1-3). However two-thirds of the book are concerned with the homolytic and heterolytic oxidations of alcohols and glycols, aldehydes, ketones and carboxylic acids, unsaturated and aromatic hydrocarbons, and finally, phenols and aromatic amines. To encompass such a wide range of oxidation mechanisms in 152 pages is not an easy task, and the choice of material may be expected to reflect some of the author's particular in-

terests. For example, attention is paid to the use of chromium, manganese and vanadium ions as oxidants. The view taken of oxidation is a broad one, so that electrophilic substitutions — halogenation, sulphonation and nitration — are also introduced. In individual chapters, attention is drawn to analogous biological oxidations. References at the end of chapters are primarily to more detailed monographs and reviews, but some reference to original papers occurs in the text.

The book is well produced with many formulae, and reaction schemes; it is virtually free of errors. This monograph provides a valuable introduction to the field of oxidation mechanisms and is recommended to all interested chemists, including students.

Reviewer: Professor G. W. K. Cavill, The University of New South Wales, Sydney.

- ● "SURVEY OF ODOUR IN PACKAGING OF FOODS", by H. G. HARVEY, 39 pages. The Institute of Packaging, London, 1963. £1.0.0.

In 1960, the Institute of Packaging was instrumental in organizing a conference on Odour in Packaging, the proceedings of which have been published in book form. One outcome of this conference was the formation by the Institute of an Action Committee which subsequently decided that the present survey be made.

Dr. Harvey has succeeded in producing an excellent summary of the information available from both literature and industry sources on the subject. The material is well subdivided and is presented in a practical way which should appeal to the reader. A comprehensive list of contents is included and it enables specific matters of interest to be located readily. In addition to the main sections dealing with the sources of odour from package com-

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ponents and the reduction of odour hazards, other useful sections are included on the nature of odour, methods of test for odours, and suggestions for future progress to reduce the problem. Thirty-one references are given, but 20 of these are from the published proceedings of the conference on Odour in Packaging.

This attractive booklet contains some very useful information on the subject of odour in food packaging, and should be read by both suppliers and users of food packaging materials.

*Reviewer: E. G. Davis,
C.S.I.R.O., Division of Food Preservation,
Ryde, N.S.W.*

THE BOTULISM PUZZLE*

A PRELIMINARY REPORT ON
EXPERIMENTAL SMOKING OF CHUB
(*Leucichthys* Sp.)

Following the finding of botulism organisms in smoked Great Lakes fish in 1963, the U.S. Food and Drug Administration specified processing conditions under which production could be resumed. A paper by M. Patashnik, C. F. Lee, H. L. Seagram and F. B. Sanford of the Technological Laboratories, U.S. Bureau of Commercial Fisheries, Seattle, Wash., College Park, Md., and Ann Arbor, Mich. ("*Commercial Fisheries Review*", Nov. 1964) is a preliminary report of an investigation to see if fish processed under these conditions (180°F for 30 min.) would be an acceptable product. A microbiological investigation is being carried out separately.

Since very little technical data on the equipment or process of fish smoking are available, these had to be obtained. It was found that, to prevent overdrying and loss of yield, a much higher heat input than that available in most smoke houses was necessary in order to heat the fish to 180°F internally in 2-3 hours, chub being a poor conductor of heat. A temperature differential of

at least 70-100°F is needed to heat the fish and of 50-60°F to hold it at 180°F. Smoking should be carried out simultaneously with the heating and the fish should be packaged promptly after cooling. The process laid down by the U.S. Food and Drug Administration is feasible but probably cannot yield an acceptable product with equipment presently in use.

In an experiment to test sterilizing after smoking, it was found that the smoke flavour was damaged. An attempt was made to smoke and sterilize chub after packaging in cellulose casings, but the smoke flavour and colour penetrated into the fish only where the fish were actually in contact with the casing.

A number of other variables were investigated.

*See also this Journal 16 (5), 276, 1964.



**INSTITUTE OF FOOD
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15th Annual
Convention, Adelaide

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*It's a very odd thing, as odd as
can be,
That whatever Miss T. eats
Turns into Miss T.*

BOOKS, PAMPHLETS, etc.

"TOMATO PRODUCTS"

(Revised Tables)

By Frank C. Lamb, National Canners Association, Western Research Laboratory, Berkeley, California, 1964. *Tomato Pulp (Juice, Puree) and Paste for Bulletin No. 27-L, Revised.*

The tables included in this publication replace the reference tables for tomato pulp, puree and paste appearing in N.C.A. Bulletin 27-L Revised, 1950.

The revised tables are based upon data obtained on approximately 350 commercial samples of tomato juice, puree and paste, packed during the 1961, 1962 and 1963 seasons. Samples were collected at random from all parts of the United States; however, all of the tomato paste was packed in California or in Utah.

Total solids was determined by the new A.O.A.C. official method as published in the Journal of the Association of Official Agricultural Chemists, volume 47, page 492, 1964. This method gives slightly lower results than the former official method. Refractive index and specific gravity were determined by presently accepted methods using Klerzyme 200 of Wallerstein Laboratories, to aid in filtration and centrifugation of tomato paste samples. The solids contributed by the enzyme preparation were subtracted from the results obtained.

Correction was made for added salt using the relationship given in Table VI. The tables are based upon total solids of tomatoes containing no added salt, but including the normal salt content of tomatoes. The latter must be subtracted to obtain salt-free solids.

The revised tables differ from the former tables in the following respects:—

1. A standard temperature of 25°C (77°F) is used for all refracto-

meter readings. Specific gravity is based on the weight of the sample at 25°C, as compared with the weight of the same volume of water at 25°C. The former tables were based upon a standard temperature of 20°C. In comparing the revised tables with the former tables, a correction must be made equal to the difference between refractometer readings and specific gravity at 20°C and at 25°C.

This change is in line with modern practice of adopting 25°C as a standard temperature. It is felt that this is a more practical temperature for most laboratories, and simplifies the use of constant temperature controllers for refractometer temperature control. It also minimizes the danger of moisture condensation on refractometer prisms when the room temperature is appreciably above 20°C.

2. Separate columns are given for refractometer readings and specific gravity of tomato paste diluted 1 to 1 with water. It was found that these readings are not exactly equal to the readings obtained on an undiluted product of half the solids concentration.

3. The tomato paste tables are divided into two sections, one for concentration from 20 per cent solids up to 35 per cent (the range covered by the former tables) and one for concentrations above 35 per cent. The values reported for solids in excess of 35 per cent must be considered tentative since an insufficient number of samples in this range were tested to establish the relationship with a high degree of certainty.

Specific gravity values are not given for undiluted samples above 20 per cent solids or refractometer readings above 35 per cent solids since no reliable means have been found to obtain accurate measure-

ments above these concentrations. It is thought that the determination of specific gravity of undiluted tomato paste does not provide a reliable control method. Samples in excess of 35 per cent solids are usually difficult to filter even with the use of enzymes, and reliable refractometer readings can not, as a rule, be obtained without dilution.

4. Table VII provides a new means of correcting refractive index and specific gravity for added salt. This correction is needed because salt has a greater effect on both refractive index and specific gravity than does an equivalent weight of tomato solids, hence the total solids of samples containing added salt would be too high if a correction were not applied. It must be emphasized that this correction applies to added salt only, and does not correct for the normal salt content of tomatoes. In this study it was found that the average salt content of tomato products known to contain no added salt, as determined by direct titration with silver nitrate, was equal to 1.56 per cent of the total solids.

Variability of Relationship of Refractometer Readings and Specific Gravity with Total Solids

The results shown in the revised table give an indication of the variability of the relationship between refractometer readings, specific gravity and total solids. The results obtained on the 1963 samples are reported separately from the composite results for the three years, 1961, 1962 and 1963, since the 1963 results show a considerably lower range of variability than did the other two years. This appears to be largely the result of an increase in skill of the analysts performing the analyses in 1963 since samples were drawn from the same sources and could reasonably be expected to show the same degree of variability for all three years.

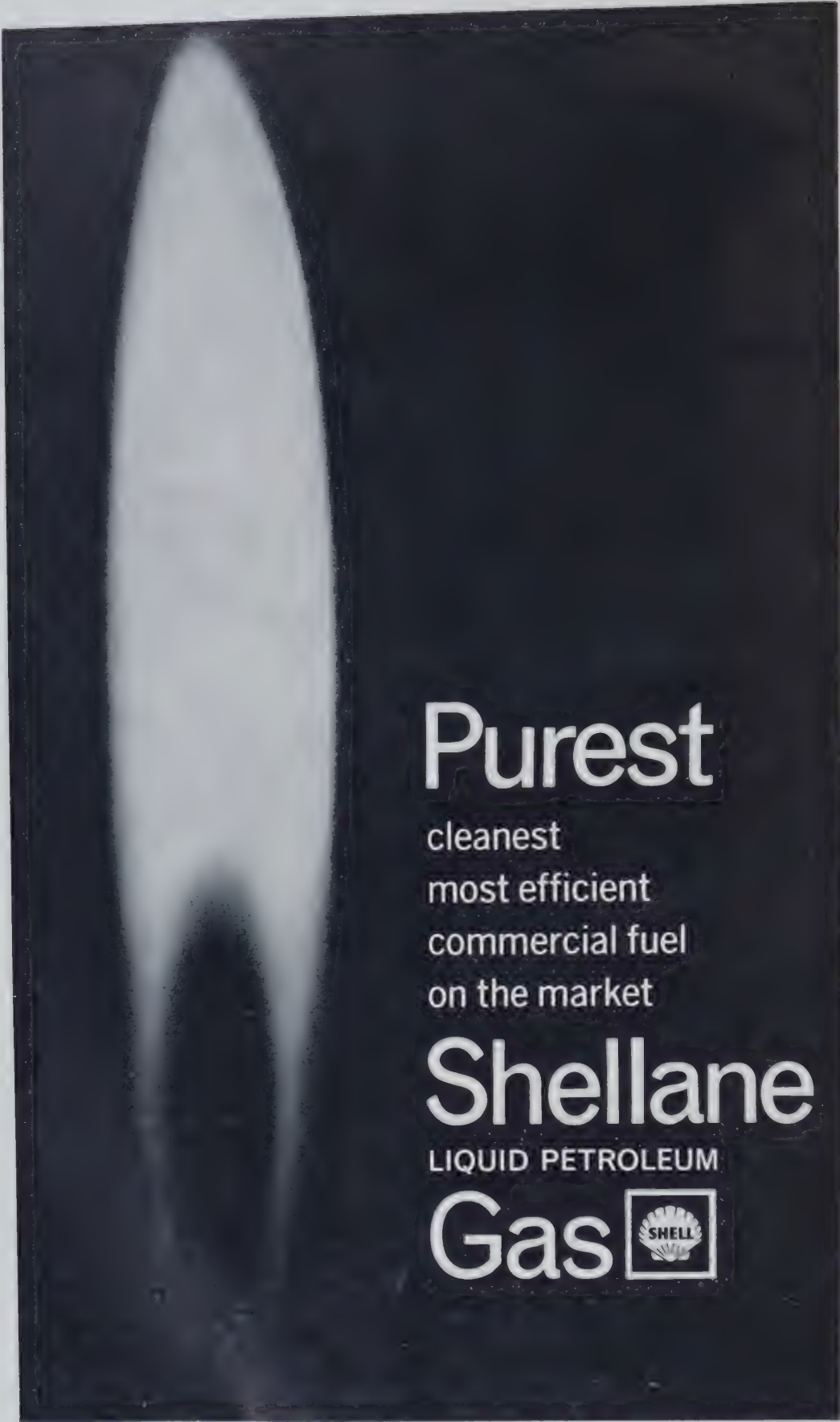
In general, the results may be interpreted as showing that in 95 per cent of samples tested, the re-

lationship shown by the tables will come within ± 0.5 per cent of the true solids concentration when refractometer readings are obtained by direct filtration of puree and paste, and within about ± 0.75 per cent when 1 + 1 dilution is made. The agreement between specific gravity and total solids is somewhat better than that between refractometer readings and total solids, but not to a highly significant degree.

In some instances there were significant differences between the results obtained in different years, but, the differences were too small to be of practical significance when compared with the composite results.

As compared with the former tables (after correction for temperature) the refractometer relationship with total solids up to about 20 per cent solids, differs very little. Above 20 per cent the difference increases with increasing solids. When a 1 to 1 dilution is used, the refractometer results do not differ significantly from the former tables up to about 26 per cent solids, but differ increasingly above that level. Specific gravity, in every instance, gives significantly different results at all solids levels. In every instance, where significant differences occur, the new tables give lower results for total solids for the same refractometer readings or specific gravities.

No significant correlations could be made between the composition of the product or the manufacturing procedure and the relationships between the various factors studied except that products made from 100 per cent pear shaped tomatoes differed significantly from products made predominantly from round tomatoes. The tables are not applicable, therefore, to samples made predominantly from pear shaped tomatoes and should not be used for these products without applying a correction. The latter are higher in insoluble solids and give correspondingly lower refractometer readings and higher specific gravities for the same solids concentrations.



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A number of other variables undoubtedly affect these relationships; however, in the present study these variables could not be isolated and tended in general to cancel out giving a nearly random distribution of all samples. It must be pointed out, however, that samples from a given packer, or packed under a given set of conditions, do not necessarily give the same average relationships shown by the tables.

●
"The Validity of the Howard Mould Count as a means of Assessing the Quality of Tomato Purees": A Review. J. C. Dakin, "Food Trade Review" (June, 1964).

CANADIAN-BACKED FOOD RESEARCH INSTITUTE AT MYSORE, INDIA

From farm hands to business leaders, Canadians recently contributed to the \$500,000 five-year project designed to help India and other south-east Asian countries produce badly needed food preservation experts.

The background of the project:—

In India and the countries that neighbour her, where they don't produce enough food to start with, almost one-third of the food laboriously sown, grown and harvested goes to waste before anyone can eat it.

This vast spoilage is a luxury that neither populous India nor her neighbours can afford. Yet the reasons for it are understandable: though ancient civilizations, these are young nations and there are still too few people trained in drying, curing, freezing, packaging, canning or otherwise preventing perishable foodstuffs from perishing.

Practically all the spoilage that now occurs in south-east Asia could be eliminated by modern methods of preservation. The effect would be to increase the region's food stocks by 30 per cent or more — not for just one year, two, or ten, but permanently.

Since September, 1964, these nations have been receiving powerful

aid in their war on spoilage from Canada. Canadian funds will launch the centre and keep it operating for five years. After that, local governments will take over.

Dr. William J. Gall of Oakville, Ontario, Canadian food technologist, has been named manager of the Mysore project and is now in India.

The Mysore International Centre is to be housed in buildings donated to the Indian Government by the Governor of Mysore State. The Indian Government itself is running the C.S.I.R. Central Food Technological Research Institute at Mysore that has already won the praise of food experts around the world. The new centre will co-operate closely with the established Indian institution.

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Miracle Fruit (*Synsepalum dulcificum*) has a unique taste-modifying property of causing sour materials to taste sweet after the mouth has been exposed to the fruit's mucilaginous pulp. Sour foods, such as lemons, limes, and grapefruit, will taste pleasantly sweet; dilute organic and mineral acids also will taste sweet.

The taste-modifying properties are easily destroyed by hot water, mineral acid, and alkali.

The Miracle Fruit concentrate does not have by itself any detectable sweetness. When activated in the mouth by acidic substances, a noticeable sucrose-type sweetness is perceived. The perception of a sweet response under these conditions is an intriguing new concept of sweetness and suggests new research approaches for studying mechanisms of taste perception.

G. E. Inglett, B. Dowling, J. J. Albrecht, and F. A. Hoglan (Research and Development Div., International Minerals and Chemical Corp., Skokie, Ill.). Presented at the 148th Meeting, American Chemical Society, Chicago, Ill. Aug.-Sept., 1964.

APV in Jam Manufacture

Until recently over 50 per cent of the confectionery jam produced in the U.K. was made by traditional methods in atmospheric boiling pans and the less common multi-batch vacuum pan system. By the end of 1964 the bulk of this grade of jam in the U.K. was produced in APV continuous production plants at rates of up to 7 tons per hour. Two APV installations are now in production and two others will be in production very shortly.

In order to provide background, the older methods of manufacture will first be briefly described. The raw material used in all methods of manufacture is basically the same.

MATERIAL

Fruit pulp of any flavour, with or without seeds in the case of raspberry or strawberry. Fruit pulp, to be used out of season, has to be preserved and this is achieved by the addition of sulphur dioxide in proportion of up to 3,000 ppm according to the age of the fruit.

Liquid pectin preserved against mould growth by the addition of sulphur dioxide up to 1,000 ppm or dry pectin.

Dry granulated sugar or sugar syrup of approximately 65/68 per cent total solids.

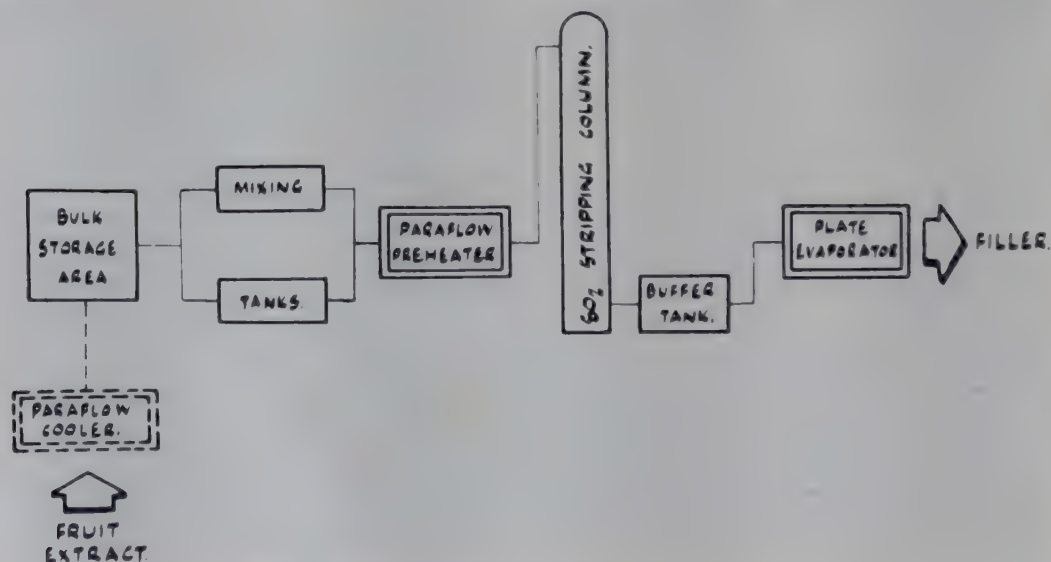
Glucose solution of approximately 65/78 per cent total solids. Dry granulated glucose may be used, but is more difficult and expensive to handle.

A complete premix would contain between 45 and 55 per cent total solids and the sulphur dioxide content would be between 350 and 800 ppm. Artificial colouring, flavouring and citric acid are sometimes added.

BATCH OPERATIONS

At Atmospheric Pressure

The jam mixture is metered into open steam heated pans where between 30 and 50 lb of water per 100 lb of product is evaporated. The high temperature of the boil (230°F) and its violent agitation drive off the sulphur dioxide but also cause some degrading of the pectin, caramelization of the sugar, and some loss of flavour. Whereas a minimum of caramel formation is essential for the production of conventional jam flavour, the degree of pectin degradation can be reduced to a minimum by the late addition of a



Flow Diagram of APV Plant in a Jam Factory.

concentrated pectin solution, late as regards the period of boiling.

*Under Reduced Pressure
(Vacuum)*

The mixture is concentrated at a low temperature under vacuum conditions but the temperature is finally allowed to increase in order to effect sterilization conditions. This system has the advantage of low temperature operation and more accurate control. It cannot be relied upon to reduce sulphur dioxide content down to statutory limits and therefore is best suited to jams made from fresh or frozen fruit or pulp from which sulphur dioxide has previously been removed.

THE APV CONTINUOUS
DESULPHITING PLANT AND
JAM CONCENTRATOR

Premix/Feed Section

Pectin, pulp and sugar/glucose may all be stored in suitable bulk storage tanks or, if stored in barrels, these would be discharged into tip tanks. In cases where fruit extract is used for flavouring jelly type jams, the hot extract is cooled through a *Paraflow* to prevent flavour impairment before the extract passes to the bulk storage area. The ingredients are metered into two feed mixing tanks by metering pumps or weigh tanks. The two feed tanks are fitted with slow

speed agitators and have sufficient capacity to provide continuous feed to the rest of the plant when used alternately. The use of two tanks also facilitates change over of flavour.

Desulphiting Section

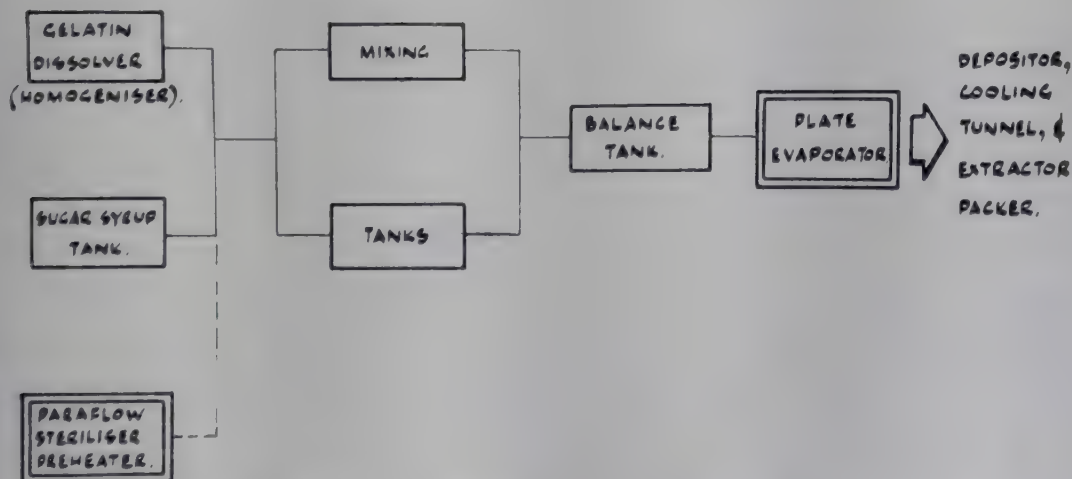
This is not required with fresh or frozen fruit. The pectin-pulp-sugar mixture is pumped through a wide gap *Paraflow* preheater which raises the temperature to approximately 230°F. The mixture is then flashed into the top of a specially designed stripping column. Stripping steam is distributed from the base of the column and passes through a volume of jam mixture which is controlled to give required residual time. The sulphur dioxide reduction is now sufficient and the premix is pumped to a small buffer tank.

CONCENTRATING SECTION

The desulphited hot premix is pumped through a *Single Effect APV Plate Evaporator* and is concentrated to the required total solids which may be up to 72 per cent. The product out temperature can range from 135°F to 190°F.

FILLING

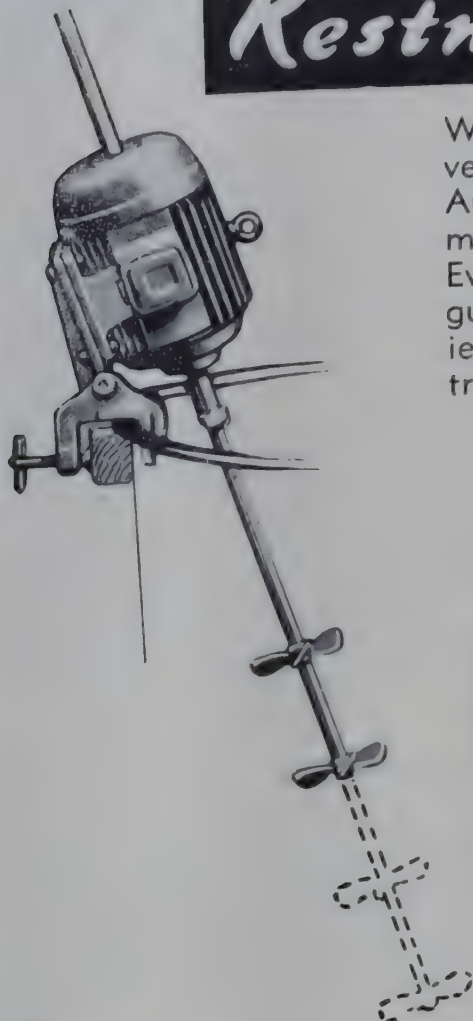
Finished jam is pumped direct to an automatic or hand filling point by the product extraction pump.



Flow Diagram of APV Plant in a Table Jelly Factory.

Kestner MIXERS

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ABOVE:

One of a range of Kestner Portable Mixers, with adjustable shaft length for use in vessels of varying depths, medium speed Series PAM ($\frac{1}{4}$ to 1 H.P.).

RIGHT:

Kestner Vertical Pedestal-Mounted Mixer, Type VPD, available in high speed (1,440 R.P.M., $\frac{1}{4}$ to 2 H.P.), medium speed (960 R.P.M., $\frac{1}{4}$ to $7\frac{1}{2}$ H.P.), and slow speed (200-400 R.P.M., $\frac{1}{2}$ to 15 H.P.).



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Recipients of the Institute of Food Technologists' 1965 Awards

PRESENTED AT THE INSTITUTE'S ANNUAL MEETING
MAY 16-20 IN KANSAS CITY

THE NICHOLAS APPERT AWARD

To Dr. Harold W. Schultz, Head of the Department of Food Science and Technology at Oregon State University, Corvallis, who invented and perfected canned meats for infants, will be presented the Nicholas Appert Award.

The purpose of the award is to honour an individual for pre-eminence in and contributions to the field of food technology.

THE INTERNATIONAL AWARD

To Dr. Mortimer L. Anson, consultant.

The award, an engraved silver salver, is donated by the Australian Regional Sections of the I.F.T. for outstanding efforts in promoting the international exchange of ideas in the field of food technology.

Dr. Anson has been credited with originating the basis for all of the present studies relating to developing new sources of proteins for the world's population. He is credited with founding the first International Congress for Food Science and Technology.

THE INDUSTRIAL ACHIEVEMENT AWARDS

To Lawrence F. Marnett, Jerome B. Thompson and Bruce D. Budde-meyer, of the C. J. Patterson Company, Kansas City.

The company is also receiving an industrial achievement award, presented for "*a significant advance in the application of food technology to food production*".

The company is being recognized for the development of VERV, a product used in bread dough. It results in a whiter, more palatable loaf of bread for the consumer, and also cuts down production time and costs for bakeries by increasing the tolerance of the dough to mixing times, which formerly was a critical problem.

THE AWARD FOR RESEARCH

To Dr. E. J. Briskey of the University of Wisconsin for research on meat. He is seeking reasons why pork often shrinks during processing and cooking, and concentrating on improving the tenderness and quality of meat.

The award was established in 1964 to give recognition to a research scientist under 35 years of age who has demonstrated outstanding ability in research in some area of food science and technology.

THE BABCOCK-HART AWARD

To Dr. Tetsujiro Obara of the Department of Agricultural Chemistry, Food Science and Food Technology, Tokyo University of Education, Tokyo, Japan. The award honours an individual who has been responsible for a significant improvement in the nutritional well-being of the public.

Dr. Obara has been responsible for bringing the citrus juice industry to Japan and thereby enriching the diet of the Japanese people.

Fatty Materials in Vegetables —

Small in amount but very important

By FRANK A. LEE,

Department of Food Science and Technology,
New York State Agricultural Experiment Station, Geneva, N.Y.

Most individuals have eaten at some time frozen vegetables that had an unpalatable flavour. A few years ago, these off-flavours were described as hay-like. This designation covered up an almost complete lack of knowledge concerning the reasons for these changes. It was known that the colour of green changed to a poorer colour tone, and that the flavours became progressively poorer. It was known, also, that a few people, perhaps suffering from what might be described as taste blindness, were totally or partially unable to detect these off-flavours.

Work was undertaken at N.Y. State Agricultural Experiment Station, Geneva, N.Y., some time ago with the idea of finding the cause of these changes. The product used for this purpose was the pea, selected primarily because of its availability and its importance as a frozen vegetable. Peas are also produced and processed in reasonable amounts in the State of New York. The unblanched vegetables were used in this work as well as an adequately blanched control.

Initially, it was thought the cause could be found in break-down products of the nitrogen compounds, and experiments were undertaken to determine whether this was the case. Unblanched peas which had been held in frozen storage for a period of 2 years were investigated. However, it soon became apparent that this group of compounds was probably not involved in these changes.

The next step involved a study of the fatty materials present. Samples were slurried, and extracted with

fat solvents. When the solvents were evaporated, the residue obtained from the unblanched peas was sour and rancid in character. Fresh peas or properly blanched peas similarly stored and extracted in this manner, showed no such deterioration. Samples were further treated in the laboratory to prove this point. Materials extracted from the dried samples showed the presence of fatty acids — compounds which form during the development of rancidity of fatty materials. It was also noticed that certain vegetables which had been stored in the unblanched condition, notably peas, foamed much more when boiled in water than those which had been stored in the blanched condition. In addition, when the raw peas were taken out of frozen storage, dried, and extracted, the residue which was left behind and freed of the solvent, showed no trace of rancid odour or off-flavour. All of the rancid material was extracted by the solvent.

CAUSE OF HAY-LIKE FLAVOURS

It seems quite clear that the cause of the hay-like flavours is the progressive development of two types of rancidity in the fatty materials present in the vegetables.

Further experiments were conducted with peas frozen in the pods, in the unblanched condition. Previously, it had been said that peas so frozen would keep for months unchanged. In view of the fact that this seemed unlikely, experiments were started under controlled con-

From "Farm Research".

ditions. In addition to noting the flavour changes, tests were made on the development of acids and peroxides. Changes were also noted in the green pigment, chlorophyll. The control was run with machine vined peas, both raw and blanched. The taste tests did indeed show that the flavour of peas frozen in the pods held longer in a desirable edible condition than those which had been machine vined and frozen raw. After 2 weeks, most people could detect off-flavours in the vined peas, but it took about a month before this could be noticed in the peas frozen in the pods in the raw condition. The blanched peas, of course, did not deteriorate in flavour quality during storage at 0°F.

While the deterioration in flavour in peas held in the pods proceeded at a slower pace than those peas which had been mechanically vined, it did take place, and such methods of storage without blanching are definitely not recommended unless the storage period is very brief — less than a month. The explanation of this limited lengthening of the storage life of peas held in the pods doubtless is to be found in the fact that the gases inside the pods are not the same as in the atmosphere, and peas in the pods are, therefore, subjected to special gas storage. It has long been known that the storage life of apples can be greatly prolonged when special gas mixtures are employed in the holding rooms, and it is quite likely that such an effect is produced in peas, together with the low storage temperatures used in this work.

ACID DEVELOPMENT SAME

It was found further, whether the peas were held in pods, or whether they were vined and then stored at 0°F, that the development of acid in the lipid material was the same. Peroxides increased at a more rapid rate in the lipid of the peas held in the pods than in those which had been mechanically vined. This curious effect might account for the fact that the colour deterioration in the peas held in the pods was greater than in those which had been

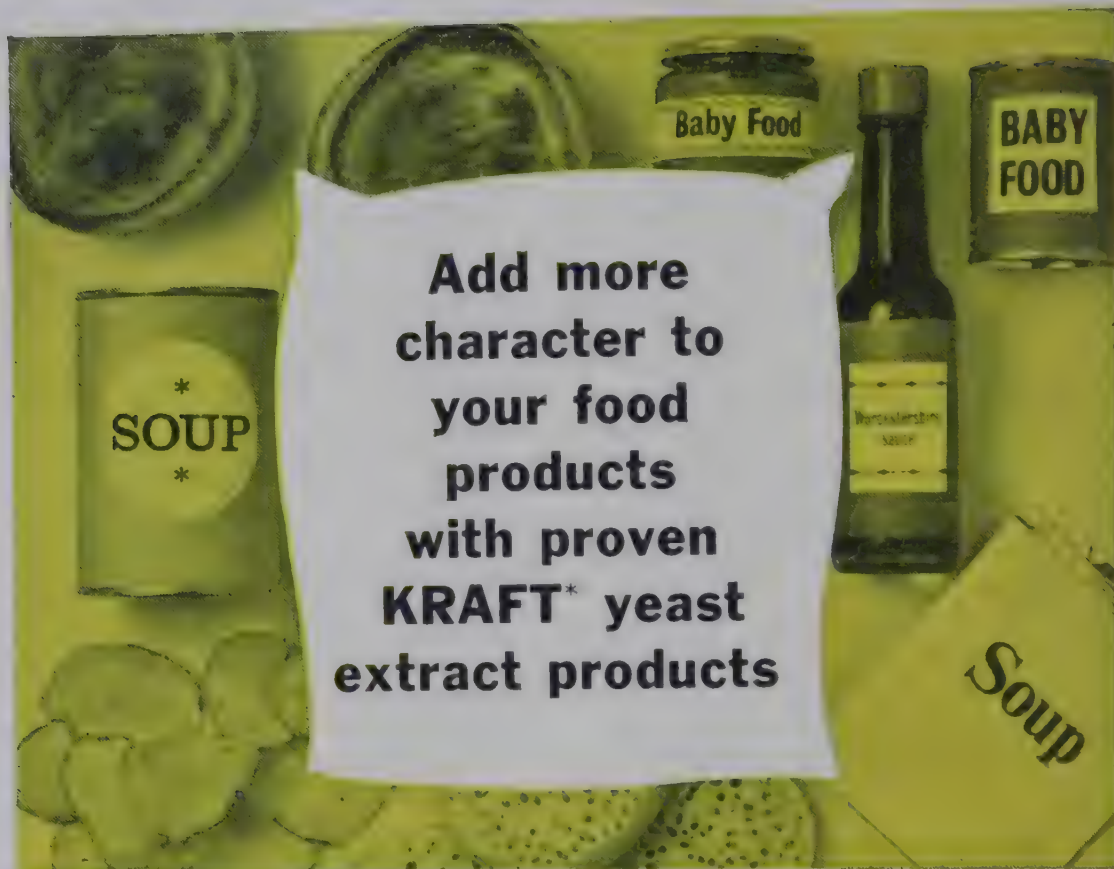
mechanically vined. This was caused by the change of chlorophyll to pheophytin, which change was greater in the peas held in the pods, as shown by chemical analysis.

The specific compound or compounds responsible for the developing of off-flavours during storage at 0°F, other than fatty acids, have not yet been determined. It is quite likely that they are very strong in flavour and odour because they are doubtless present in very small quantities.

Percentagewise, the total content of fatty material in most fresh vegetables is rather small. However, one must consider that it is not necessary to have these compounds present in large quantity if they produce subsequent compounds which are very strong in flavour and odour. It is this probability that makes the substances in this group so very important when loss in quality due to off-flavour is under consideration.

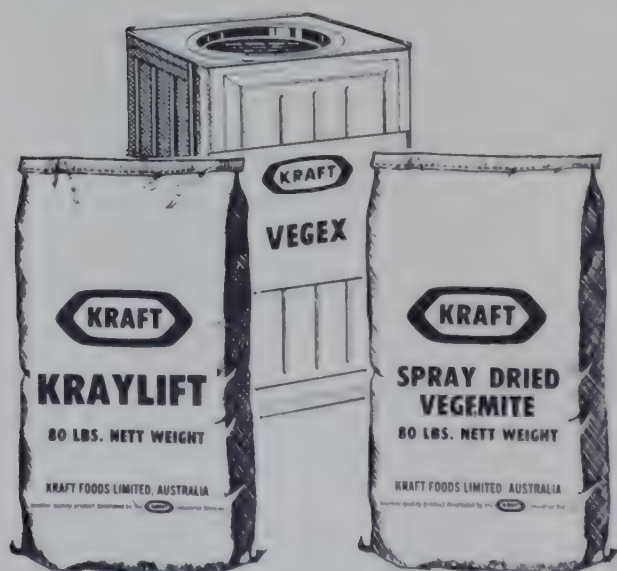
Tests made some time ago at another institution indicated that poor flavour in frozen vegetables can be correlated with the presence of residual enzymes. This suggests that the vegetables in question were insufficiently blanched before storage. This in turn could bring about a deterioration in the fatty material as discussed earlier. This could account for unsatisfactory products in the home, when inadequate blanching equipment is employed. It is necessary that adequate blanching of vegetables be carried out, if products held under adequate storage condition, 0°F or lower, are to maintain their quality for long periods of time.

Off-flavours found in frozen vegetables are caused by developing rancidity of the fatty materials present. While it is now clear that vegetables in pods such as peas can be stored at 0°F for brief periods without appreciable deterioration, it is no substitute for blanching. This latter process is the only method available at present to prevent the development of off-flavours caused by rancidity.



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KR484

Tables of Composition of Australian Foods

The Commonwealth Department of Health has found it necessary to revise the Tables of Composition of Australian Foods, so that more processed foods may be included, and figures for those foods all ready listed brought up to date.

The co-operation of Food Technologists and members of the Food Industry is being sought for this project so that all available figures for the nutrient value of each food item listed may be assembled and considered. In this way it is hoped that the published figures will be as reliable as possible.

The Nutrition Section of the Department is sending out printed cards, setting out the details sought. Australian Food Manufacturers are being requested to fill in one card for each of their products, providing as much information as possible. If figures are not available for every nutrient listed, they are asked to complete the cards as much as possible and return them to the Director, Nutrition Section, Commonwealth Department of Health, Canberra, A.C.T. More cards are available upon request.

Frequently, manufacturers market foods of similar nutrient value, differing only in flavour, *e.g.* biscuits and confectionery. In such cases analyses of each recipe are not required, it would be sufficient to give average or preferred values for the nutrients listed. Thus beside the heading "*brief description of food item*" a statement such as "*Biscuits — plain and savoury*" could be given. Under Brand name manufacturers are invited to list the major types such as Sao, Potato Snax, Jatz, Salada, Uneeda, Saloon Cracker, etc. On the other hand if the same food (such as milk) is marketed in a number of forms a separate card would be required for each of these and the descriptions of food items and brand names would read something like "*powdered full cream milk — spray dried*" and *Bonlac, Oak and Sunshine*, etc., or "*evaporated milk — unsweetened*" and *Bear, Carnation, Ideal*, etc., respectively.

The information provided by companies would, at all times, be regarded as confidential and brand names will not appear in the published Food Composition Tables.

Food Composition Data Card

NUTRITION SECTION, COMMONWEALTH DEPARTMENT OF HEALTH

SERIAL NO.	FOR OFFICE USE	CLASS OR GROUP	SERIAL NO.	FOR OFFICE USE
Description of Food item:			Brand Name	
	Composition	Laboratories where analysed	Approx. No. of Samples and date	Batch No. (if any)
Edible Portion			Address of Manufacturer	
Water				
Fibre				
Protein				
Fat				
Carbohydrate (ash %)				
Calories (/100g.)				
Calcium (mg./100 g.)				
Iron (mg./100 g.)				
Sodium (mg./100 g.)				
Potassium (mg./100 g.)				
Vitamin A (I.U.)				
Carotene (I.U.)				
Thiamine (mg./100 g.)				
Riboflavin (mg./100 g.)				
Niacin (mg./100 g.)				
Vitamin C (mg./100 g.)				
Other Nutrients:				

Please return to Director, Nutrition Section,
Institute of Anatomy, A.C.T.

Do not detach before posting

Aspergillus Flavus Toxin

By (Miss) RUTH M. ENGLISH,
Australian Institute of Anatomy, Canberra

The presence of toxic principles in some samples of groundnut (peanut) meal was first recognized in Britain during 1960⁽¹⁾ when many young turkeys died after consuming meal from Brazil; some 100,000 young turkeys dying in the course of a few months. Affected birds died within a week, during which they lost their appetite, became markedly lethargic and developed a weakness of the wings. Post mortem examination showed haemorrhages or pale necrotic lesions in the liver and frequently engorged kidneys. The toxic factors were found to be products of certain strains of the fungus *Aspergillus flavus*, infecting the groundnuts. These toxins have been collectively termed *aflatoxin*. Four closely related substances (aflatoxin B₁, B₂, G₁ and G₂) have been identified and have been shown to be compounds of difurano coumarin derivatives⁽²⁾.

Aspergillus flavus is a common mould⁽³⁾. It can be isolated from many stored dried foodstuffs and from tropical soils. It grows rapidly but requires somewhat more moisture than most moulds. At tropical temperatures (30°C) it will grow at 80-85 per cent relative humidity and above. This corresponds with moisture contents in groundnut kernels and defatted meal of about 9 per cent and 16 per cent or more respectively. This knowledge is of great practical importance in considering control measures. Also of considerable practical significance in devising means of control was the discovery that in any *naturally* toxic batch of groundnuts, mould development and the toxic factor occur in a small proportion of kernels only, those generally distinguished by having discoloured flesh.

Since *Aspergillus flavus* will grow only when sufficient moisture is available, aflatoxin production can in the first instance take place on groundnut kernels only before the post harvest drying brings the moisture content below the critical level. Mould growth might, of course, take place also at any later stage if the moisture content of kernels, cake or meal rose above the critical level. The toxin is very stable, so that, while subsequent drying and processing of the nuts kills the fungus, the toxin is unaltered. While the nuts are still in the ground, their moisture content is high (at least 25 per cent) but, despite this, mould development seems normally not to occur at this stage. Apparently the healthy growing nut has a protective mechanism against mould growth and this may be supplemented by the physical barriers to spore penetration afforded by the intact shell and seed coat. If, however, the nuts are left unharvested beyond maturity, mould attack can occur in the ground and may be serious. Insect attack on the nuts may contribute to the trouble by breaking down the natural barriers.

Probably the most critical stage is that immediately following harvest. The nuts are still of high moisture content when lifted, and unless both atmospheric conditions and harvesting practice are good, drying to the safe moisture level may not take place quickly enough to avoid significant mould development. In some countries and regions, harvesting may take place when the rains are still about; in others, farmers may not take sufficient care to secure rapid and complete dry-

From "Food & Nutrition News", 22, 3, 1965.

ing. In either circumstances, and particularly where there is a combination of both, the risk of mould infection, and consequently aflatoxin development, is severe.

There is experimental evidence that the kernels from broken shells are more toxic than those from intact shells. Such damage may facilitate the entry of mould spores and provide a more favourable environment for their subsequent growth. Thus the practice employed in a few areas of shelling the nuts before drying appears to be hazardous, unless rapid drying is possible. Again, the practice employed in some regions of deliberately wetting nuts before shelling and during crushing may also be dangerous.

There is evidence that crops other than groundnuts may, under adverse conditions, be attacked by *Aspergillus flavus* and so be rendered potentially toxic. Random selection of cereals⁽⁴⁾ bought at the local market in Addis Ababa, Ethiopia, during the rainy season showed not only toxic *Aspergilli* but a toxin-producing strain of *Penicillium islandicum* (shown to produce a hepatotoxin). The grains included sorghum and millet and the cover-grass *tef* used to make the staple *injera*, a flat sour bread cooked at a low temperature after two or three days' fermentation. A toxin-producing strain of *Aspergillus flavus* has been grown on heat sterilized soya-bean, runner-bean (seed), cotton seed, wheat and poultry feed, not containing groundnut⁽⁵⁾. An extract of 2 g of the cotton-seed meal with mould growth, free of gossypol, killed ducklings six days old in six days. Two toxic strains of *Aspergillus flavus* were grown on heat-sterilized runner-bean seeds. Both cultures were positive in the fluorescent tests and produced typical lesions in the livers of ducklings⁽⁶⁾.

It has also been shown that an extract of whole milk from cows given toxic groundnut as 20 per cent of the diet and the fraction precipitated by rennet were toxic to ducklings⁽⁷⁾. The degree of tox-

icity of the milk was related to that of the groundnut given. The toxin was not destroyed by pasteurization. This *milk toxin* has now been isolated on thin-layer chromatography⁽⁸⁾ and found to differ from both aflatoxin B₁ and G₁. It is pointed out that these results were obtained from cows fed very toxic meals. An investigation of 19 samples of National dried full cream and separated milk and proprietary infant foods showed no evidence of toxicity⁽⁷⁾.

Sensitivity to aflatoxin varies considerably from one species to another, although in all cases, the young animal is much more susceptible than the corresponding adult. Among poultry, ducklings are highly sensitive, young turkeys somewhat less so and chickens⁽⁹⁾ comparatively resistant. Of the farm animals piglets⁽¹⁰⁾ appear to be most sensitive; young calves⁽¹¹⁾ also are highly susceptible, but lambs much less so. In general, aflatoxin is hepatotoxic and the liver shows fatty change, parenchymal damage and proliferation of bile ducts. In rats, aflatoxin is by far the most active hepatocarcinogen known. This has been demonstrated by feeding toxic groundnut meal⁽¹²⁾ and the pure aflatoxin added to a normal laboratory diet⁽¹³⁾. Liver lesion were also produced in young rhesus monkeys by aflatoxin⁽¹⁴⁾. At a dosage of 1 mg daily, aflatoxin was always toxic to these animals. Till the end of the second week they were apparently unaffected and, at the fourteenth day liver biopsies showed only slight changes. Between the second and fourth week all the animals developed anorexia and apathy; the urine was highly coloured, and within two days, they died in coma.

So far there is no evidence of acute illness in man resulting from aflatoxin, though the use of crushed groundnuts as a poison by a tribe of British Guiana Indians has been reported⁽¹⁵⁾. Regarding commercial groundnut products designed for human consumption, the posi-

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tion is reassuring. Refined groundnut or peanut oil, which is used extensively for margarine manufacture and cooking purposes, is always toxin-free, even if it has been produced from contaminated nuts. Any trace of aflatoxin that may have found its way into the crude oil is removed by the alkali wash employed in the refining process. Edible peanuts are usually handpicked and inferior nuts (damaged, discoloured or obviously mouldy) which contain the toxin, are normally removed. Peanut butter is usually manufactured from selected nuts, and so should be toxin-free. In essence, there is reason to believe that selection of peanuts reduces the potential toxin level far below the range where a biological response might occur⁽¹⁶⁾.

There have been several suggestions that aflatoxin could be implicated in the development of primary liver carcinoma in man^(17,18). Primary liver carcinoma in man has a varied distribution throughout the world. Its incidence in parts of Africa and Asia is high and it is known that children eat groundnuts gleaned from the fields in areas with a high incidence of hepatic carcinoma among young adults. Recent research into the pattern of cancer in Central Africa disproves the belief that cancer is a disease of civilization⁽¹⁹⁾. The incidence of cancer has remained constant in the African community since the first accurate case records were kept in 1897. The commonest tumour of the alimentary tract is primary cancer of the liver.

Mention should be made of the use of groundnut protein for human supplementary feeding, particularly for infants and young children. This is usually in the form of groundnut flour, containing about 50 per cent protein. It is reported⁽¹⁸⁾ that international agencies have restricted this programme of supplementary feeding, because batches of meal from all producing countries have been found to control aflatoxin. In India, an uncontaminated prod-

uct is being secured⁽³⁾ by a thorough hand selection of nuts before preparation of the flour; testing for aflatoxin has been introduced as a further safeguard.

The most important problem is how to prevent aflatoxin formation in groundnut and groundnut products for animal and human consumption. There seems little hope of finding an economical way of deactivating already toxic groundnut meal or cake, and though hand picking may be effective where whole nuts are concerned, this is too costly. The most urgent need is to improve agricultural, storage and transport practices in producing countries that mould contamination is negligible. The possible hazard from long-term exposure to traces of this very active carcinogen deserves very serious consideration.

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DATA PROCESSING IN THE FOOD INDUSTRY

The Food Technology Association of Victoria in association with I.B.M. Australia Pty. Ltd., is conducting a special course on "*Data Processing in the Food Industry*"

The course consists of eight sessions, from 3.30 p.m. to 5.30 p.m. on consecutive Wednesdays commencing June 2nd and is being held in the rooms of the Royal Commonwealth Society, 22 Queens Road, Melbourne. The fee for the course is £4.0.0 per person.

It is desirable that the status of those persons attending the course should be at executive level.

The course is designed to give to executives who attend all sessions:—

Appreciation of Data Processing to be able to recognize an application which is suitable for Data Processing, and have some idea of a Data Processing approach.

Appreciation of the extent that the Food Industry is presently using this technique.

Awareness of the assistance to Management which Data Processing can give in such areas as:—

Invoicing; Debtors; Sales Analysis; Inventory, including the problem of maintenance of fresh stock and minimizing out-of-stock situations; Production scheduling; Process control; Vehicle scheduling.

A typical case study around which some of the lectures will concentrate is as follows:—

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4. Number of salesmen and delivery trucks is large.

A booklet of lectures summaries is provided for all who are enrolled.

Enquiries concerning the course should be directed to Mr. D. T. Cracknell, Coca-Cola Bottlers (Melbourne) Pty. Ltd., Levanswell Road, Moorabbin, or Mr. J. Johnston, I.B.M. Australia Pty. Ltd., 173 Fitzroy Street, St. Kilda.

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Flour milled in the ordinary way is damped by passing through steam or water and then through a section that sticks the damp particles together in such a way that the particles have a sponge-like character. These are subsequently heated and dried. This gives it the properties of free running and easy mixing with water without lumping, useful for household purposes, especially for making sauces, etc.

A short description with a diagram is given by L. Speight in "*Milling*" (143, 182, 1964).

SENSORY TESTING GUIDE FOR PANEL EVALUATION OF FOODS AND BEVERAGES

The I.F.T. Committee on Sensory Evaluation has prepared a guide as a first step in the development of standardized taste testing procedures. Types of problems, types of tests, and a glossary are included.

"Food Technology", 18 (8), 25, 1964.

MEAT TECHNOLOGY

Ageing Steaks

One of Australia's foremost restaurateurs recently disclosed the secret of his succulent steaks — he wraps them in shrink film and ages them for 28 days before serving them to his patrons.

Mr. John K. Walker, of the famous Angus Steak Cave in Sydney wraps his rumps and sirloins in *Cryovac* shrink film and holds them in his coolroom at 34°F for 28 days. After this period Mr. Walker feels that he can provide his patrons with the finest steaks in the country.

Mr. Walker said that he first discovered the shrink film ageing method while on a tour of the U.S.A., where steak houses had been using the time-honoured method of breaking down the fibres of the beef by hanging it in their coolrooms for 28 days.

Although this had the desired effect, Mr. Walker recalled, the revolting appearance of the beef after those four weeks would have turned most of us off steak for good!

To correct the appearance — and let's be frank, the smell! Mr. Walker added, about one third of the outsides of the rump and sirloin-of-the-bone had to be cut off and thrown away.

It is from the remainder that patrons get their famous *New York Cuts* — considered the world's best (by Americans anyway). The flesh and the fibres had virtually been softened by decomposition — just like a Camembert cheese, Mr. Walker recalled.

Wrapping the meat in shrink film achieved the same effect of ageing and softening, but with no wastage, no smell and no evaporation, Mr. Walker explained. The meat looks fresh and attractive and the method is so much more hygienic, he said.

From "Australian Packaging News"

Salami Drying

During the drying of salami the distribution of moisture is not uniform in a radial sense. Shrinking therefore is not uniform either. In the initial stage the shrinkage of the casing is hindered by the paste content due to which stresses arise in the casing. Later these stresses are relieved. In the second stage the paste also begins to dry. The deeper layers impede the shrinkage of the outer layers of the paste which causes tangential tensile stresses in the outer layers. Consequently permanent deformations occur in the plastic layers. The location of the peak stresses shifts inwards with the progress of drying. Quick drying may lead to indentations and fissures in the paste. The formation of indentations and fissures is considerably affected by the meat to fat ratio as well. The procedure elaborated by the author for the determination of changes in dimensions due to shrinkage permits establishment of the stresses if the necessary parameters are known. Thus the highest rate of drying that can be applied without entailing internal and external deformations can be determined.

"Technical Aspects of the Drying of Salami. The Mechanism of Contraction and its Characteristics". Imre, L. "Husipar", 13, No. 1, pp. 13, 1964.

Pale Watery Pork Muscle

From a review of recent work by R. G. Cassens in "Food Preservation Quarterly" (23, 69, 1963) on the causes of this phenomenon, it is concluded that some progress has been made in determining factors related to relevant muscle change. For instance, it is possible that myofibril damage, caused by rapid glycolysis in muscles in which rigor mortis sets in rapidly at low pH, has an important bearing on water-binding capacity.

While the incidence of pale watery muscle may be reduced by correct feeding, handling and slaughtering of the pigs, further fundamental research work is necessary before a final solution of the problem can be reached.

FOOD MICROBIOLOGY

Essentials of the Assessment of the Hygienic Condition of Food Factories and Their Products

The functions and limitations of laboratory examinations in the prevention of food-borne disease and the necessity for and essentials of microbiological standards for foods are discussed in a paper by D. A. A. Mossel in the "*J. Science of Food & Agriculture*" (15, 349, 1964).

Methods for the microbiological examination of foods and food plants (machinery surfaces and air), and for the evaluation of disinfectants used in food factories are reviewed.

•

New Type of Air Sterilizing Filter

Three grades of disc filter made from polyvinyl alcohol (P.V.A.), with effective pore diameters of 11, 25 and 43μ respectively, were compared with sintered metal filters having pore diameters of 30μ and 40μ . The air to be filtered was contaminated with a known concentration of *Serratia marcescens*. Two of the P.V.A. filters had relatively high collection efficiencies, but only one had an efficiency greater than 99.99 per cent at air speeds of 0.0493 metres per second. Neither of the sintered metal filters was of sufficiently good performance to be of technical use. The performance of glass-fibre filters has been examined mathematically, and from the results of this analysis it can be predicted that the P.V.A. plate filter is a possible alternative with tremendous savings in size and a reduction in maintenance costs.

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Measuring Surface Contamination in Food Plants

An article in "*Meat*" (Nov., 1963) describes a relatively simple and quick method for determining the degree of bacterial surface contamination and the way in which this method was used to assess the efficiency of steam cleaning equipment in reducing contamination on walls, equipment and pigs' carcasses in a slaughterhouse.

The degree of surface contamination is expressed by the logarithms of the counts rather than by the counts themselves. The number of colonies developed from the swabs taken, does not have to be counted accurately; instead the number of colonies on each of the agar slants is estimated approximately and the number of slants exhibiting counts in each of the following ranges, 0-3, 3-10, 10-30, 30-100, 100-300, 300-1000 and over 1000, are recorded.

These frequencies are corrected and the *corrected cumulative frequencies* are plotted on probability paper and the logarithmic mean derived from the straight line plot.

•

Pasteurizing Liquid Egg Whites Now Possible

The U.S.D.A. has developed a method of stabilizing liquid egg white to withstand pasteurization.

An edible acid, such as lactic acid, is added to the egg white together with a harmless salt, both in minute quantities. Acid is used to adjust the pH to 7, where all egg-white proteins except conalbumen are stable to temperatures of 140-145°F for several minutes. Salt converts conalbumin into a metal-conalbumin complex which is adequately heat stable.

Stabilized egg white can then be pasteurized by the procedure now used in the U.S.A. to pasteurize whole eggs — heating to 140-143°F for $3\frac{1}{2}$ -4 minutes.



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EDITORIAL

(Continued from page 381)

focussing attention on the scientific and technical needs of their food processing industries.

In view of his long association with such matters on the Australian scene, there is no doubt that Professor Reuter will carry out his assignment with distinction. His friends from the Journal, industry, universities and governmental departments wish him a stimulating and fruitful leave period, and look forward to his return to the familiar role of Journal Editor.

EVALUATION OF TWO METHODS OF TOMATO JUICE CONCENTRATION

1. HEAT TRANSFER COEFFICIENTS
2. PRODUCT COMPARISONS

Tomato juice concentrated by a conventional method was compared with the product of a procedure in which only the serum is concentrated. The serum is obtained by centrifugal separation of the juice. The concentrated serum is finally combined with the unconcentrated pulp. The over-all heat-transfer coefficients and liquid film coefficients for the new method were found to be superior to those for the conventional method. The conventionally produced concentrate was thicker in consistency and higher in ascorbic acid concentration than the produce of the *serum method*.

The rate of ascorbic acid decomposition in storage was the same for both methods and no significant differences in carotenoid content were found. Browning was more intensive in *juice method* concentrate because of the higher temperature involved.

J. Kopelman and H. C. Mannheim, "Food Technology", 18, 117 (1964).

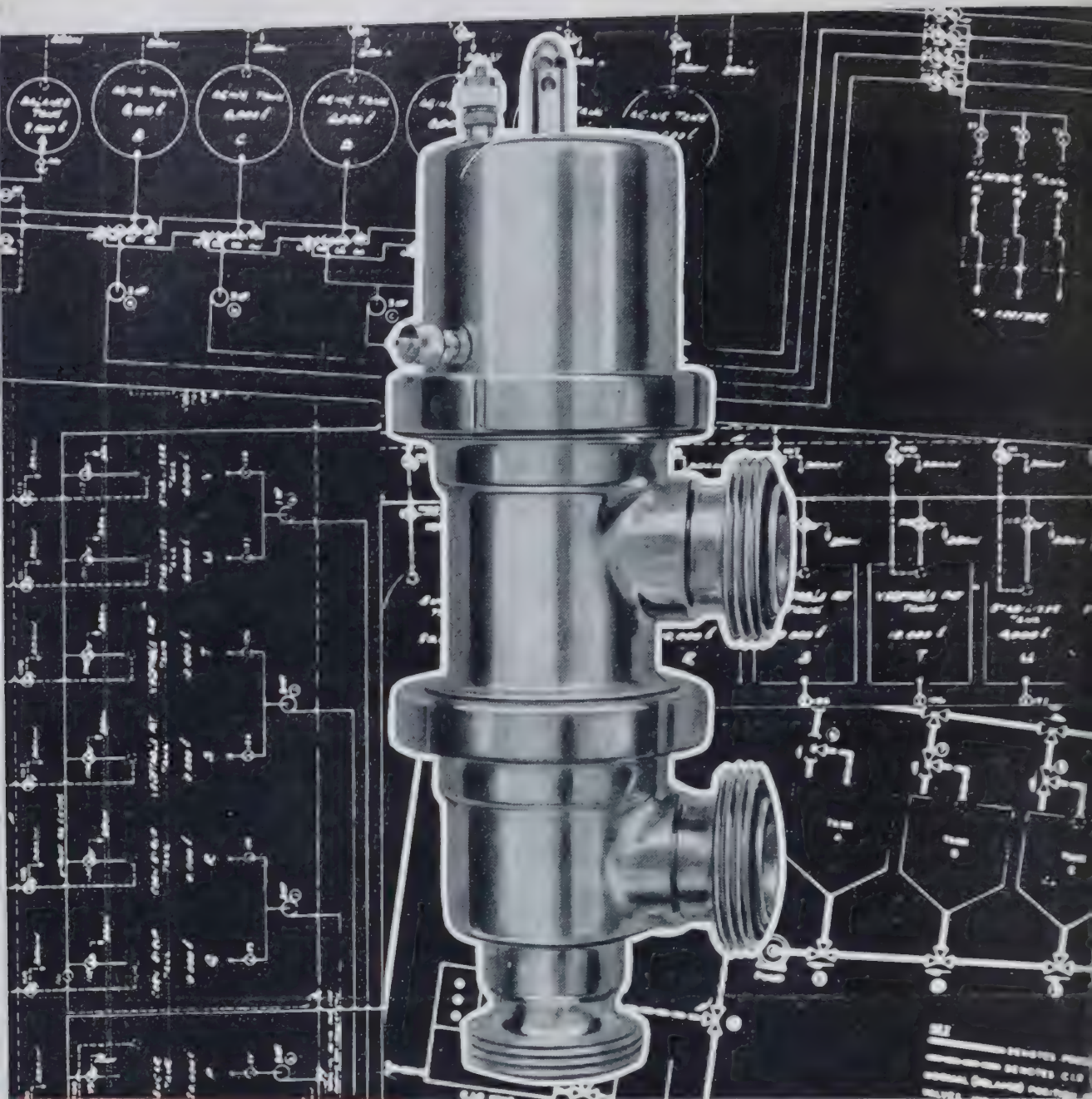
THE CHEMICAL "PEELING" OF CUCUMBERS

Technical equipment and process of *chemical peeling* of cucumbers are described and the advantages of *chemical peeling* discussed in a paper by W. Aulich, "Industrielle Obst-und Gemueseeverwertung", 49, 303, 1964. Two tables give examples from the laboratory tests and the tests carried out using production techniques: characteristics of the raw materials and waste due to treatment, concentration of NaOH or the lye respectively, temperatures of the liquors, etc., are indicated.

It is estimated that in the United States alone, more than 135 million pounds of polyethylene will be consumed in 1965 for coated milk cartons.

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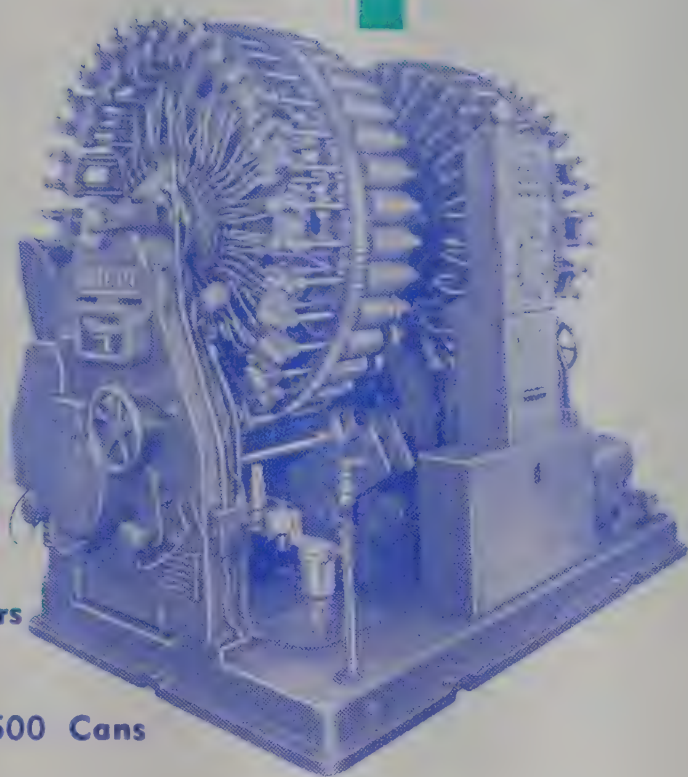
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FOOD TECHNOLOGY

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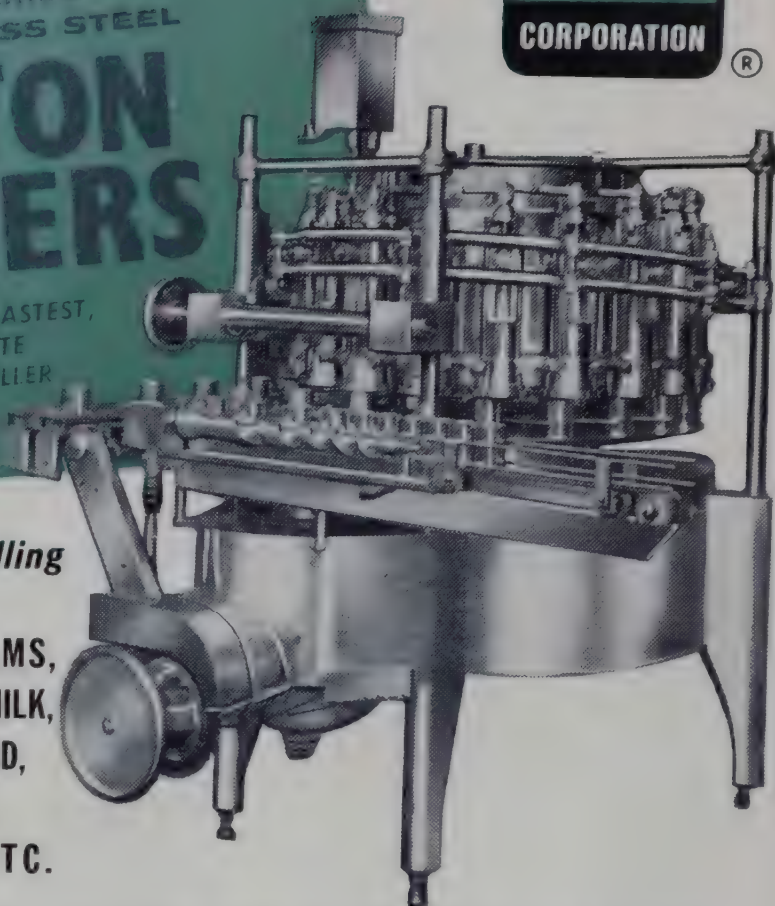
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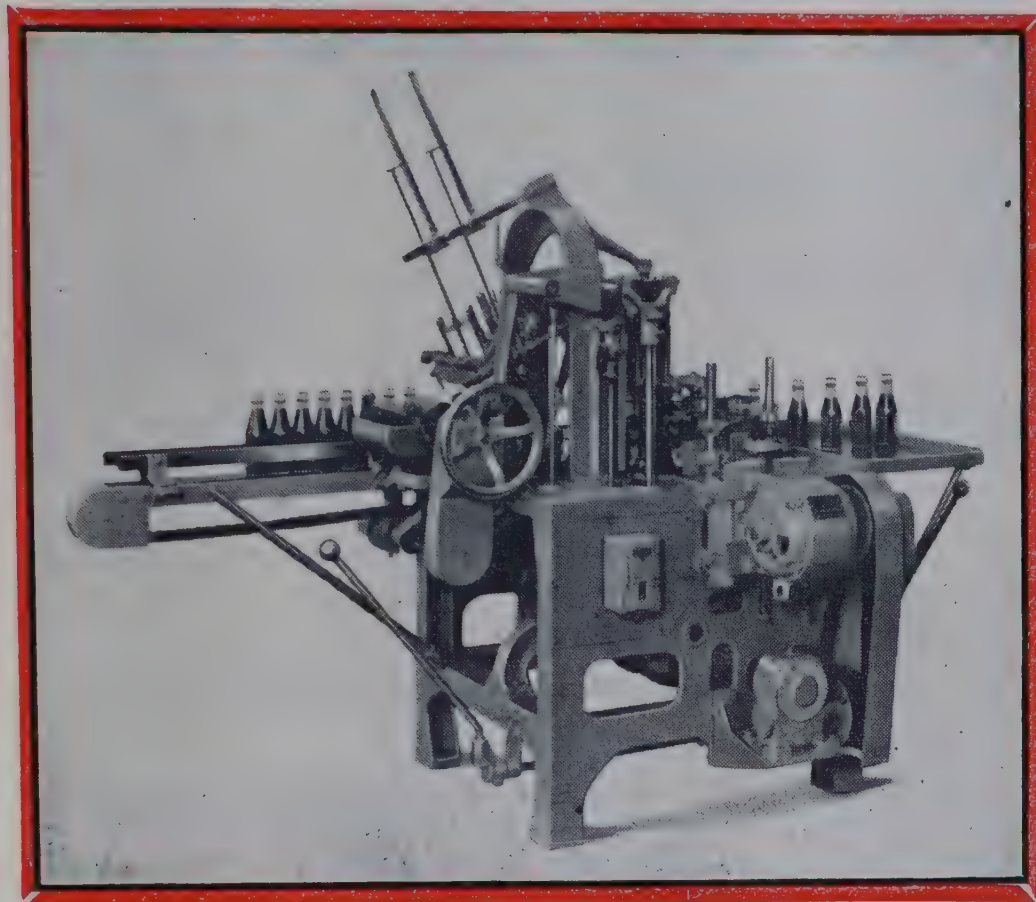
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Acting Editor:

R. A. EDWARDS, A.S.T.C., B.Sc., Ph.D.,
Senior Lecturer in Food Technology, The
University of New South Wales.

Business Manager:

S. M. ADAMS.

Office:

12 O'Connell Street, Sydney, N.S.W.
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Loose-Leaf Legislation

Previous discourse in this Journal has referred to the mechanism by which C.A.F.T.A. and various advisory committees collaborate to achieve the blessed state of uniformity in State Pure Food Regulations. The mechanism is undeniably complex, containing much to provoke confusion, misunderstanding and even frustration, but it does have the over-riding virtue that it appears to work and to work well. Over the years, procedures have been developed whereby the manufacturer can follow the tortuous path of a particular draft regulation until it finally leaves the Food Standards Committee to go to the State Health Departments for favour of adoption and subsequent gazettal. It is at this stage that a second series of confusions and frustrations may readily arise.

One cause of this situation is the present non-uniform system of *regulation presentation* that operates at the State level. In order to keep a master copy of State regulations up to date, the manufacturer must constantly be on the look-out for amendments published in documents such as the Commercial Journal, the Government Gazette, or, from time to time, in this Journal. It is then a job for scissors, paste and blue pencil to put his copy in order, that is, in line with the current legal situation. The conscientious manufacturer, after some considerable effort, produces a colourful and interesting document, though not always one noted for its clarity nor for the confidence it inspires in the reader.

Appreciating these difficulties, both because of their own require-

ments and those of the manufacturer, the N.S.W. Department of Health will shortly issue the N.S.W. Pure Food Act and Regulations in a loose-leaf form. Future amendments, suitably edited, are to be mailed directly to those interested for a nominal fee, and a reminder notice is to be sent to subscribers to renew their subscriptions for the following year. This means a considerable job of editing by the N.S.W. Health Department but will ensure that manufacturers are kept fully abreast of current gazettals in N.S.W.

This innovation was originally suggested as long ago as 1962 by the N.S.W. Chief Health Inspector, but it was not until the F.T.A. of N.S.W. also made its views known that concerted action was taken.

The practice is one that has been operating in Canada and various States of the U.S. for several years. In Canada, regarded by many as a leader in the regulatory field, the loose-leaf system takes the form of a multi-coloured document, with different colours denoting different classes of products. For technical reasons, the multi-coloured approach is not to be followed in N.S.W.

The new document will not only be a boon to N.S.W. manufacturers, but also to those who for various reasons must keep abreast of the legal situation throughout the Commonwealth. The N.S.W. Department is to be congratulated on this forward move. It is to be hoped that other State Health Departments will soon follow their lead and adopt a similar system.



Effluent Treatment in the Food Processing Industries

By Dr. T. L. JUDELL,

Water and Trade Wastes Consultants Pty. Ltd., Sydney

INTRODUCTION

The food industry, like others, has come to the realization that industrial waste treatment is a real item of production cost. Considerable effort is being given to reducing the cost of this phase of production.

In addition to economic considerations it has been learned that all too often the efficiency of effluent treatment has considerable industrial importance in terms of public relations both in the factory community and in the area where the products are sold.

gether with the polluting strengths of these effluents. Polluting strength is expressed as *biological oxygen demand* (B.O.D.)

To say, for example, that a waste water has a B.O.D. of 400 ppm means that one gallon of waste would absorb all the oxygen from forty-five gallons of river water in five days, if no replacement of oxygen took place from the atmosphere or other source.

The wastes consist largely of carbohydrates in suspension and in solution.

The volume and characteristics of

TABLE 1
Particulars of Waste Waters from American Canneries

Commodity	Volume of waste waters per ton of raw vegetables or fruit (Imp. gal.)	Average biochemical oxygen demand (ppm)
Spinach	6200	615
Apricots	3900	1,020
Peaches and Pears	2400	1,340
Tomatoes	1700	990

CHARACTER AND QUANTITY OF WASTE WATERS

The character and quantity of effluents from the food processing industries vary widely from one installation to another but the total content of organic matter in the wastes produced by the canning industry in the U.S.A. is estimated to be about one per cent of all industry.

In Table 1 typical volumes of waste waters discharged from some American canneries are listed to-

waste waters very enormously amongst the various products packed, among packers of the same product and from day to day in the same plant. It is essential to study each individual case rather than to rely on published data when designing a treatment plant.

It would be expected that the processing of food for freezing might produce larger quantities of waste because of the need for a more thor-

An Address to the 14th Convention of the Institute of Food Technologists, Australian Regional Sections, Canberra, A.C.T., 1964.

ough cleaning and washing of the product from a bacteriological standpoint. Studies in the U.S.A. have indicated that two or three times the volume of waste per unit quantity of production occurs in the frozen food processing factory as compared to a cannery.

An analysis of a flow and material balance frequently indicates an economical solution to the waste treatment problem by eliminating or reducing the quantity of waste matter or waste water. A reduction of this nature can be accomplished by the following methods:—

Recovery or utilization of waste products.

Removal of waste in a dry state.

Segregation of uncontaminated waste water such as cooling water. By such segregation the hydraulic load on the waste treatment plant may be reduced.

METHODS OF TREATMENT

Effluent treatment has to provide effective treatment at a minimum cost and a number of methods of treatment are available. However, it is generally agreed that waste waters from the canning and drying of vegetables and fruit should always be screened at the factory, whatever means of disposal of the liquors is adopted.

Treatment of food processing wastes will be discussed under the following headings:—

Screening.

Combined treatment with domestic sewage.

Aerobic biological treatment.

Chemical precipitation.

Land disposal.

The preferred method of treatment will depend upon:—

The availability of municipal waste treatment plants.

The degree of treatment required to yield adequate control of pollution.

Cost of treatment.

Screening

Rotary or vibrating screens are usually employed, the rotary type being equipped with sprays of water or treated effluent at a pressure of at least 40 p.s.i. in order to wash the screenings into a discharge trough. Vibrating screens yield drier and more easily handled solids than rotary screens. These screens will produce solids with a moisture content between 85 and 95 per cent depending upon the product. Screenings can best be disposed of by land spreading.

Many of these installations are arranged so that the screenings are elevated to a hopper from which they are discharged to a vehicle for removal. This practice, apart from its convenience, minimizes the washing of separated screenings back into waste waters. Most American investigators have recommended screens with 20-40 mesh per inch although screens with openings as large as one half inch may be permitted in special cases.

It is desirable to screen wastes containing vegetable matter with as little delay as possible in order to prevent biological action and the leaching out of soluble constituents. Efficient screening of all liquid wastes carrying any screenable material is essential unless the wastes are discharged into isolated lagoons where odours present no problem.

Combined Treatment with Domestic Sewage

Experience indicates that the most desirable and efficient means of treating food processing wastes is by treatment in conjunction with domestic waste waters which effect significant dilution of the industrial effluents.

This means of treatment is often not used to advantage because:—

Industrial loads on existing municipal plants may exceed the design capacities of these plants.

Hostility has been created in municipalities by the indifferent

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attitude of industry towards the treatment of wastes.

There is no reason why effluents from the food processing industry cannot be economically and satisfactorily treated with domestic wastes if the facilities are designed for that purpose and if all parties contribute their real proportionate share of the capital investment and operating cost.

Because of the very nature of the food processing business, many canneries are located near the source of raw materials, namely fruits and vegetables grown in farming areas. As a result many sizeable canneries are found in small towns where no municipal waste treatment plants are available, or if they are available, they are of such design and capacity that the seasonal peak effluent loads from these canneries cannot be included in their operations.

Under these circumstances investigations should be conducted into the feasibility and economics of constructing or modifying a municipal treatment plant, aided by funds provided by the food processing company.

However, each effluent treatment project must be determined on its own merit and in many cases the food processor finds that he is required to provide his own effluent disposal system.

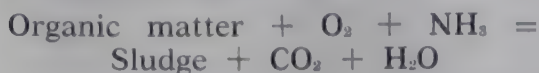
Aerobic Biological Treatment Processes

Biological waste treatment facilities cover a wide spectrum of process applications from the aerated lagoon and stabilization basin with long periods of liquid retention to the high rate activated sludge and biological filtration process having short aeration periods.

The selection of method depends primarily on the characteristics of the wastes, geographical location and the degree of purification of effluent which must be achieved.

Organic materials are usually transformed into gaseous end prod-

ucts and cell structure by biological action which may be expressed by the general equation:—



Approximately 60 per cent of the organic matter is assimilated to sludge. The remaining 40 per cent is burned to carbon dioxide and water to yield energy for this assimilation.

In addition to the above reaction, the sludge undergoes continuous auto-oxidation.



For most purposes the discharge of an effluent with a BOD of 20 ppm will be considered satisfactory.

Lagoons and Stabilization Basins

Lagoons and stabilization basins may be classified into three general types:—

Type I — Large holding reservoirs with detention periods in the order of months. Oxygen is supplied by means of surface aeration and by dilution of the waste with non-contaminated water.

Type II — Oxidation ponds with detention periods ranging from less than a week to 6 weeks.

This type of pond is subdivided into two classifications, the facultative pond and the high rate pond. In the facultative pond, BOD is removed by sedimentation, bioflocculation and aerobic oxidation. Oxygen is obtained from algal growths. Surface aeration is another source of oxygen. Settled sludge deposits undergo decomposition by acid and methane fermentation. A balance between the aerobic and anaerobic processes is essential to minimize odours.

The high rate pond is constructed with shallow depths which permit light to penetrate to the bottom. Fully aerobic conditions are maintained by mixing. In this system, the organic matter is oxidized by bacteria, which are utilizing oxy-

gen, released by the algal growths. The algae employ solar energy to synthesize cell substance from carbon dioxide and ammonia.

Type III — Aerated lagoons with detention periods ranging from a few days to two weeks, depending upon the efficiency desired. Oxygen is supplied by diffused or mechanical aeration systems, which also cause sufficient mixing to induce a significant amount of surface aeration. Organic matter is oxidized by bacterial action.

Many factors are involved in the waste stabilization mechanism which begins immediately after waste enters the pond. Settleable solids, suspended solids and colloidal particles are precipitated by the action of soluble salts which are concentrated by evaporation.

Under anaerobic conditions the pond effluent may have objectionable characteristics and the addition of sodium nitrate as a supplementary source of oxygen is often practised in an endeavour to reduce odours.

Perhaps the main serious objection to lagoons and stabilization basins is that they provide breeding places for insects. Great care in locating lagoons is necessary but this method of treatment can be used by the seasonal canner provided that:—

sufficient area of land is available;
the topography and character of the soil is suitable;

the location of the lagoon is isolated from populated areas and the factory.

Activated Sludge

Activated sludge is the floc produced in a waterborne waste containing organic constituents by the growth of zooglyphic bacteria and other organisms in the presence of dissolved oxygen. The floc is accumulated in sufficient concentration by recycling.

The activated sludge process is a biological treatment process in

which a mixture of waste and activated sludge is subsequently separated from the treated waste (mixed liquor) by sedimentation for disposal or return to the process, as required. The treated waste overflows the weir of the settling tank in which separation from the sludge takes place.

The aeration process may be considered in three functional phases:—

a rapid absorption of waste substrate by the active sludge;

progressive oxidation and synthesis of the absorbed materials and the constituents concurrently removed from solution;

further aeration resulting in oxidation and dispersion of the sludge particles.

Various modifications of the activated sludge process have been developed in order to achieve economic advantage in construction and operation.

The contact stabilization process — a two stage aeration process and a combined activated sludge — high rate biological filtration process are two modifications which have been developed in order to meet problems arising from the discharge of wastes from food processing industries.

Biological Filtration

The biological filtration process may be defined as a fixed bed system over which the waste water is intermittently or continuously discharged and brought into contact with biological films which are supported on the filter medium. Filter media usually consist of crushed stone or plastic shapes which have been developed in recent years.

Aerobic conditions are maintained by a flow of air through the filter bed, induced by the difference in specific weights of the atmosphere inside and outside the bed.

The mechanism of BOD removal in a biological filter is similar to that of the activated sludge pro-



These manufacturers have one thing in common... they all use Darex sealing compound

Sealing compound is a vitally important component of cans. It gives protection against leakage caused by damage to the seams. It guards against the entry of bacteria through weaknesses in the double seams. Small wonder that the "big names" in the Australian canning industry use Darex sealing compound exclusively. They go by results, and they have proved that Darex gives the best results — every time.

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Photomicrograph of the double seam of a can at the lap showing the seam structure. This is a critical area for can sealing.

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Packed in Free 5 gallon containers

THESE HIGHLY CONCENTRATED FREE FLOWING JUICES
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(Padlock Brand)

Full particulars, prices and samples available from the
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MELBOURNE, SYDNEY, BRISBANE, ADELAIDE

cess. Removal of BOD occurs by bio-sorption and coagulation from that portion of the flow which passes rapidly through the filter and by the progressive removal of soluble constituents from that portion of the flow with increased residence time.

Chemical Precipitation

The development of large food processing plants and the first efforts to control industrial effluents in the U.S.A. brought about the use of chemical precipitation. The use of iron and aluminium salts with lime produces excellent floc formation. Optimum dosages range from one to three pounds of lime and one-quarter to one pound of coagulants. A reduction in BOD of approximately fifty per cent is achieved and eighty-five per cent of suspended solids are precipitated.

This method of effluent treatment is expensive and by itself and not particularly effective. The disposal of sludge from the precipitation process also requires large sludge disposal areas.

Land Disposal

Disposal of food processing wastes by ridge and furrow irrigation and by spray irrigation is frequently employed.

Disposal of effluents by irrigation yields advantages as follows:—

There is the possibility of recovering some value in the form of better pasture for grazing of live stock.

Installation and operation can often be lower in cost than any conventional type of waste treatment plant. The discharge on waste land can be within the range — 2500 gal. to 6200 gal. per acre per day. This amount may be applied to some soils at a daily rate of as much as 25,000 gal. per acre per day, provided that a three or four day resting period between applications is allowed.

The controlling factor in the cost of the irrigation system is the

volume of waste discharged from the plant rather than the amount of solids and BOD which are lost.

This is a most important consideration in the treatment of concentrated wastes.

The effect of winter operations, the effect of wastes on the soil itself and on underground water supplies, the most practical method of separating or grinding solids prior to spraying, and the design of spray nozzles are some of the factors which must be given careful consideration.

The best type of country for irrigation is a farm on flat land with fairly porous soil and subsoil.

WATER-SOLUBLE POWDERED CAROTENOIDS

Beta-carotene and other carotenoid pigments are usually classed as fat-soluble, and their principal use in the food industry has been in the colouring and enrichment of fat-based foods.

The introduction of several new *water-soluble* carotenoids has been announced by Roche Products Pty. Ltd. of Dee Why, N.S.W.

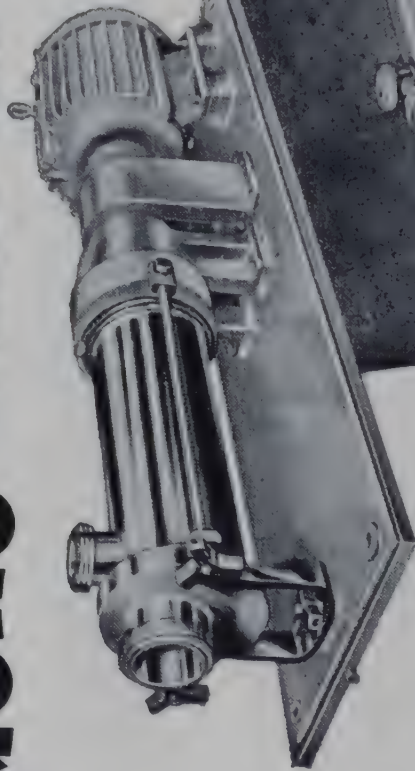
The products include beta-carotene (bright red-brown), apo-carotenal (grey-brown) and canthaxanthin (violet-brown colour). All preparations consist of small spherical particles in powder form, and may be dissolved in warm water. The carotenoid content of all preparations is 15 per cent (150 mg/g). A mixture of gelatine, starch and sugar has been adopted as the carrier.

Applications of the materials include beverages, cheese, cake-mixes, custards and soup powders, tomato products and other foodstuffs. The carotenoids are permitted colouring matters since they are synthetic duplications of substances which are already naturally present in foods.

Further information may be obtained from Roche Products Pty. Ltd.

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• N.Z.: Dalhoff & King (N.Z.) Ltd. AGENTS ALSO throughout Papua & N.G., the Philippines and Taiwan.

Diethyl Pyrocarbonate as a Preservative For Canned Orange Juice

By D. W. GROVER,

M.B.T. Research Laboratories, Sydney

SUMMARY

Experiments have been made using diethyl pyrocarbonate (D.E.P.C.) for the cold sterilization of orange juice. The level of D.E.P.C. used was up to 500 ppm with or without up to 50 ppm of sulphur dioxide. Such treatment caused a marked reduction in the microbial population of the juice and extended the shelf life many-fold. However, sufficient organisms remained in the juice to cause spoilage within the expected shelf life of canned or bottled juice. For example, from 30 treated cans only six remained sound after two and a half months' storage. Even the unblown cans had large bacterial counts, and for this reason would have been unsuitable for sale. At the highest levels of treatment tested their was only a 50 per cent chance of the cans not being blown after this period.

INTRODUCTION

The chemical behaviour of D.E.P.C. in sparkling wine has been known since 1951^{1,2}. In 1959 a report of its inhibiting effect on micro-organisms appeared in the German literature³. This has been followed by a series of articles describing its application to a variety

of foodstuffs, for example, wine^{4,5,6}, soft drinks⁷ and beer⁸. Shortly following the original discovery, Farbenfabriken Bayer A.G. commenced production of D.E.P.C., firstly as *trial product 5908* and then under the registered name *Baycovin*. In 1962 they issued a technical bulletin⁹ describing the properties and uses of Baycovin in its application to various foodstuffs. Quantities required for the treatment of fruit juices and other beverages were given in this bulletin as follows:—

Substrate	DEPC* (g/100 litre)
Fruit juices	5-20
Fruit juices with natural turbidity ..	10-40
Citrus juices	15-50
Fruit juice beverages, citrus type bottled with CO ₂	3- 8
Beer (Dortmund type, treated with Bentonite and prefiltered)	5-30
Wine	5-15

*Diethyl pyrocarbonate

Subsequent to the completion of this investigation a report¹⁸ has appeared in which much larger dosages are stated to be necessary for the destruction of yeasts and other micro-organisms.

The figures quoted are as follows:—

D.E.P.C. EFFECTIVENESS AGAINST MICRO-ORGANISMS

Microbial Species	Count per ml.	Concentration D.E.P.C. ppm	
		Inhibition	Lethal
Saccharomyces pastorianus	400	300	1000
S. cerevisiae	400	200	1000
	10000	600	1500
Torula utilis	500	2500	2600
	600	1500	3000
Lactobacillus pastorianus	—	4000-5000	—
Penicillium lutem	—	4000-5000	—
Aspergillus terreus	—	—	—

In a publication by the Seitz organization¹⁰ it was stated that D.E.P.C. does not have an effective preserving action. Experiments were described in which it failed to suppress secondary fermentation of sweet table wine.

The toxicity and public health aspects of the use of D.E.P.C. have been discussed in several of the papers already mentioned, as well as in some devoted entirely to these subjects^{11,12,13,14}. Its restricted use has been approved in U.S.A.¹⁵, Sweden, Greece and Western Germany.

EXPERIMENTAL

Two series of experiments were made. The first was made with single strength orange juice in 8 oz crown sealed soft drink bottles. The second was made with four times concentrated orange juice, packed in 8 oz lacquered cans. Techniques tested included juice de-aeration, small additions of sulphur dioxide, pre-sterilization of containers, and vacuum packing.

FIRST SERIES — SINGLE STRENGTH JUICE:

The Bayer recommendations for the use of D.E.P.C. were followed, and the rate of spoilage observed. No microbiological counts were made of the fresh juice, but the stored juice was examined microbiologically.

The experiment involved variations in juice preparation, bottling technique, and preservative dosage as follows:—

Preparation and Bottling

Two alternative treatments were tested:—

"F" *Favourable* — The juice was cooled to about 50°F about thirty minutes after pressing, and was de-aerated by vacuum. Air was displaced by a stream of CO₂ from above the juice during the addition

of the preservative, and from the headspace during bottling.

"U" *Unfavourable* — The juice was not cooled or de-aerated, and air was not displaced by CO₂ during processing and bottling.

Preservative Dosage

Three levels of D.E.P.C. were employed and two of SO₂:—

D.E.P.C. . . . 175, 300 and 435 ppm
SO₂ 22 and 58 ppm

To cover these variables, 12 batches, each of six replicate bottles, were prepared.

MATERIALS AND METHODS

ORANGE JUICE:

Freshly pressed from Valencia oranges;

Refractive index
(sugar scale) . . . 10.5%
Acidity as citric acid . . . 1.6%
pH 3.3

Oxygen tension
— as received . . . 80%
— de-aerated . . . 21%
Ascorbic acid . . . 58 mg/100 ml

No microbiological examination was made of the fresh juice.

CROWN SEALS:

Australian Seal Company seals; compressed cork liners.

DIETHYL PYROCARBONATE:

Baycovin from Henry H. York & Co. Pty. Ltd., Sydney, received September, 1962. Refractive Index 1.3953, CO₂ 52.9% (theoretical 54.2%).

ADDITION OF PRESERVATIVES

D.E.P.C. was added as a 10 per cent v/v solution in absolute ethanol; SO₂ as a 10 per cent w/v solution of sodium metabisulphite in water. The sulphite solution (either 0.5 or 1.3 ml) was pipetted into a 3 litre beaker, 1500 ml of juice added and a powerful stirrer started. The D.E.P.C. solution (2.6, 4.5 or 6.5 ml) was added dropwise, mixing continued for one minute and the treated juice bottled. Reference has already been made to de-aeration and air

displacement. Bottles were immediately inverted, shaken periodically for the first two hours, left inverted for 24 hours, and then stored with seals upwards.

FLAVOUR:
The fresh juice was of good flavour. Some tasting tests were made after two months storage

TABLE 1
Tasting Tests After Storage 60 Days

DEPC ppm	Processing *	SO ₂ ppm	
		22	58
300	F	+	0; ++
300	U	++; +	++; ++
435	F	0; ++; +	+++; +
435	U	++; +	

0 = no off flavour; + = slight off flavour; ++ = very unpleasant.
* See Preparation and Bottling, Experimental.

STORAGE
Bottles were held at about 72°F and removed periodically for examination.

RESULTS
Counts of total micro-organisms after storage for up to 17 weeks at room temperature ranged from 1 to 2500 per ml, the de-aerated juice generally showing lower counts. Sulphur dioxide appeared to exert at least as great an effect as D.E.P.C. No preservative levels consistently produced complete sterility. Replicate bottles from the same batch varied widely in microbial population.

The organisms most frequently observed were yeasts and bacteria (cocci and rods). Moulds were infrequent, and never in larger numbers than 12/ml. Mixed populations of yeasts and cocci were common.

ASCORBIC ACID:
Ascorbic acid was determined in the fresh juice and in the treated juice after nine weeks at 70-75°F. Loss during storage, which ranged from 0.25 per cent, was not significantly associated with preservative treatment.

PRESSURE IN BOTTLES:
Bottles of juice without added preservative developed dangerous pressure in a few days. None of the treated bottles had developed measurable pressure when opened.

(Table I), usually more than one bottle being tested.

SECOND SERIES
COMMENCED APRIL, 1963

The first series demonstrated incomplete sterilization by D.E.P.C. at the highest level tried. A feature of the counts obtained on the stored juice was the unexplained variation from one container to another. One possible explanation could have been sporadic re-infection from the crown seal resulting from incomplete contact with the juice during the time it contained lethal amounts of D.E.P.C. The observed effect of the additional SO₂, which is both volatile and relatively long-lived in the juice, tends to support this hypothesis. For this reason some of the containers used in the second series were sterilized before filling.

Cans were used instead of bottles. The variables studied were similar to those studied in the first series. Microbiological tests were made at all stages.

Three factors were studied in a factorial experiment:—

Containers: Some cans were steamed prior to filling, some were not.

Diethyl pyrocarbonate: Three levels — 500, 350 and 200 ppm.

Sulphur dioxide: Two levels — 0 and 20 ppm.

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MATERIALS AND METHODS

Containers: 8 oz cans, 301 x 207, hot dipped plate, *Epon* lacquered on all internal surfaces. In preparation for filling, half of the cans were placed in an atmospheric steamer, lightly covered with the lids, and heated in live steam for 30 minutes.

Juice: The concentrated juice was made from Valencia orange juice, which, after being passed through a muslin screen, was concentrated under high vacuum at a temperature not exceeding 122°F to a quarter of its original volume. The juice was cooled as soon as possible after concentration and held at about 41°F until canned. The resulting juice was quite opaque and had the following analysis:—

Soluble solids by refractive index (sugar scale)	30.7%
Insoluble solids	1.4%
Ash	1.2%
Acidity as citric	2.2%
pH	3.9
Ascorbic acid	84.3 mg/100 ml
Total Bacteria per ml ..	a) 2200 b) 2500
Moulds per ml	a) 20 b) 10
Yeast per ml	a) 80 b) 20

NOTE — The bacteria counted on a nutrient agar plating exclude any anaerobes and microaerobes. Anaerobic organisms would not be expected in large numbers in juice. The yeasts and moulds were counted on a wort agar plating.

PRESERVATIZATION

The preservative solutions used were:—

D.E.P.C.: 10 ml Baycovin diluted to 50 ml with absolute ethanol.

SO₂: 6 g potassium bisulphite to 100 ml with cold boiled water (3 per cent w/v SO₂).

Mixing was done in a 3 l beaker into which the necessary amount of sulphite solution was placed (0 ml to 0.5 ml). Juice was then added (1200 ml if no SO₂; 800 ml if SO₂ used) a powerful stirrer switched on, and the D.E.P.C. solution (3.0, 2.1 or 1.2 ml if no SO₂; 2.0,

1.4 or 0.8 ml if SO₂ used) added dropwise. Mixing was continued for two minutes and 200 ml juice immediately poured into each can. Cans were closed under a vacuum of about 20 inches, inverted, and shaken occasionally for about 30 minutes. They were then left inverted overnight. In the morning they were stored in a room at 68-77°F. Samples were drawn from each batch after standing 24 hours for microbiological examination.

The yeast population was reduced at this stage to a level such that viable cells were not found in 1 ml aliquots. Moulds also were reduced in numbers, but bacteria had a high survival rate with counts from 1400 to 1600 per ml. The level of preservative did not appear to have a significant effect on the survival of bacteria in the range tested.

STORAGE RESULTS

Changes in Microbiological Population:

After 10 days at 68-77°F many of the cans had blown. These were removed for microbiological examination. Cans continued to show swells until at 84 days only five out of 30 remained unblown. These apparently sound cans were then opened for testing.

Of the nine cans which blew within 10 days, eight contained juice treated with the lowest level (200 ppm) of diethyl pyrocarbonate, and two juice treated with 350 ppm D.E.P.C. Yeast counts varied from 0 to 12 x 10⁵/ml, viable moulds were found in all of these cans and, where the yeast count was low, comparatively large numbers of aerobic bacteria were found. Juice in cans which remained unblown after 84 days was devoid of viable yeast cells and had low mould counts (<2/ml). Bacteria counts were high, especially anaerobes which in some instances exceeded 10⁶/ml. This group of cans contained juice treated with either 500 ppm of D.E.P.C., or 350 ppm D.E.P.C. associated with 20 ppm SO₂.



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DISCUSSION

Diethyl pyrocarbonate at the levels tested appears to be quite unsuitable as a process of sterilization for canned orange juice. A large reduction in yeast and mould populations is effected by the recommended treatment, but the total count of bacteria is not materially reduced. In some cans rapid spoilage occurs, apparently by the growth of yeasts, with associated gas production and partial or almost complete suppression of bacteria. Where this kind of spoilage does not occur (presumably owing to destruction of yeast and moulds by the preservative treatment), longer life without gas formation is achieved, but the stored juice is found to contain large numbers of aerobic bacteria, and very large populations of anaerobic bacteria.

ACKNOWLEDGEMENTS

Acknowledgement is made to the Directors of Mauri Brothers and Thomson Limited for permission to publish this paper and to Mr. Kinsey and Miss Schwartz for the microbiological work reported here. Thanks are also due to Associate Professor F. H. Reuter for allowing the use of the exhaust box and vacuum can closer in the Department of Food Technology, The University of New South Wales.

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AUSTRALIAN SOCIETY OF DAIRY TECHNOLOGY

The 7th Biennial Conference was held from 4th-6th June, 1965 at the Hotel Florida, Terrigal, N.S.W.

Theme: The Manufacture of Ice Cream in all its Aspects

FRIDAY, 4th JUNE:

- 4.00 p.m. Assembly and Registration.
- 6.30 p.m. Assembly and Cocktails.
- 7.30 p.m. Official Dinner.
- 8.30 p.m. Official Opening — Mr. C. J. Macdermott, Queensland United Foods Ltd.

SATURDAY, 5th JUNE:

- a.m. Subject — "Mix Preparation".
Chairman: C. M. Barker, Dairy Farmers Co-operative Ltd. "Raw Material", G. F. Greethead, Streets Ice Cream Pty. Ltd. "Processing", H. L. Mitten, St. Regis Pulp & Paper Corp. "Quality Control", F. Stone, Peters Ice Cream Pty. Ltd.
- p.m. Subject — "Freezing, Packaging and Hardening".
Chairman: E. G. McCartney, Consolidated Milk Industries Pty. Ltd. "Refrigeration Aspects", A. McPherson, A. E. McPherson & Associates. "Operational Aspects", F. Beauchamp, Amscol. Adelaide. "Control Aspects", L. F. Wilson, Toppa Ice Cream Pty. Ltd., Vic.

SUNDAY, 6th JUNE:

- a.m. Subject — "Storage, Distribution and Marketing".
Chairman: W. D. Phillips, Streets Ice Cream Pty. Ltd. "Quality Defects in Ice Cream during Storage and Distribution", D. Kinnersley, Dairy Farmers Co-operative Ltd. "Recent Developments in Transportation", J. Huggens, C.I.G. Ltd. "Marketing of Ice Cream", H. Curtis, Streets Ice Cream Pty. Ltd.
- Summary of Proceedings — J. Pascoe and L. L. Muller.

The Australian consumer vegetable bill is around £100 million a year for fresh, canned and frozen varieties.

Food Technology in Europe

(Continued from Vol. 17, No. 7, page 404)

CHOCOLATE AND SUGAR CONFECTIONERY

For the final session on Chocolate and Sugar Confectionery the Chairman was Mr. A. P. Buchanan who, as Chairman of the Food Group, sponsors of the symposium, was able to thank all who had contributed to make the symposium a great success.

Two papers were presented in this section:—

CHOCOLATE, by Dr. R. Egli, Afico S.A., Lausanne.

The evaluation of the quality of cocoa beans deserves special attention and this evaluation is still effected on the basis of a subjective — although standardized — assessment of defects in the beans. It is possible, however, to determine the degree of fermentation of cocoa which affects their quality by a colorimetric analysis, except for the Criollo varieties which have no pigments. By more research using newer techniques, objective methods may be adopted relating the chemical substances responsible for flavour and aroma to quality.

A distinctive feature of modern chocolate technology has been the introduction of mechanical methods of processing, mixers, and plastifiers operating by continuous process, and high capacity conches. The manufacture of chocolate by a rapid, continuous process, yielding a high quality product, was not possible if the lengthy stage of conching had to be retained. Therefore, various procedures have been proposed (Taubert, Mosimann) whereby the organoleptic changes obtained by conching are brought

about at different stages of manufacture.

The manufacture of milk chocolate is rather a special case since the drying process is usually carried over to a more advanced stage during the manufacturing operations.

The theory of tempering is closely related to the chemical composition and the crystalline structure of the fats, and particularly the cocoa butter. The polymorphic changes occurring in the fats play an essential part during this stage in the manufacture of chocolate. The purpose of the tempering process is to induce the crystallization of the cocoa butter, independently from the more unstable polymorphic changes occurring in the latter. There have been new developments in the tempering technique in the course of the past few years; high-speed automatic tempering machines have been introduced, as well as the technique of tempering by *inoculation* and, quite recently, tempering by mechanical process under pressure.

Apart from the physical measurements of the degree of temper effected on the finished product, a new technique providing for measurements to be effected on the chocolate mass before moulding and coating has been applied on the industrial scale. This technique is based on the determination of the state of crystallization of the fat (solidification rates) and enables an inefficient tempering to be rectified before the cooling operations. The fat bloom phenomenon is closely related to the problem of tempering and efficient tempering has the effect of checking the development of fat bloom, but tempering is not the sole factor which has an influence on fat bloom. The addition of

other edible fats to cocoa butter may have some effect in inducing or checking the development of fat bloom in chocolate mass.

SUGAR CONFECTIONERY, by Mr. A. G. Sansome, Edward Sharp & Sons, Maidstone.

Sugar confectionery has developed from a small scale craft industry into an important food manufacturing industry but in spite of the real nutritional value of the products the industry caters essentially for the luxury and impulsive type of buying.

Large scale production has necessitated increased technical control and the introduction of such techniques as evaporation, vacuum drying and pressure heating. The advantages of automation and rationalization will lead to a reduction in the number of varieties on sale. The diversity of food laws over the world, however, does not facilitate rationalization in the industry particularly as the industry exports some 15 per cent of its output.

The adoption of controlled mechanical production has been greatly facilitated by developments in the quality of raw materials and the attractiveness of the products has been furthered by the essence manufacturers' contribution in understanding flavour characteristics.

A large amount of work has been done in order to understand the basic behaviour of sugars. With data on boiling points, solubilities, vapour pressures of solutions, viscosities, etc., it is now possible to take a chemical engineering approach to the industry.

The use of continuous gelatinization under elevated temperatures and pressures has made possible the *chemical engineering approach* in the manufacture of starch jellies, and marshmallows with great economies and has also opened up the way to automatic instrumental control of quality.

Work published by Kramer in

America has suggested that the shelf-life of boiled sweets is effected, not only by sugar composition and moisture, but also possibly by the mechanical stress remaining in the sweet. Agitation in the plastic state before fully cold may cause *graining* or recrystallization.

An important facet of modern confectionery technology is the development of packaging. The demand for prepacked units in handy sizes has been met by developments in machinery but essentially by improved wrapping materials — films, papers and laminates for adequate protection under differing conditions of storage.

DISCUSSION

Mr. J. H. Mallows asked if any work had been done on the relationship between the quality of finished chocolate and the degree of fermentation of the cocoa beans used in its manufacture. What, if any, is the influence of different roasting techniques on differently fermented beans? Dr. Egli replied that work has been carried out on the relationship of the finished chocolate and the flavour of the different beans. A well-fermented bean gives a pure organoleptic quality but if under fermented it is not so good and in fact can be quite bad. It is hoped to measure such effects in the future.

Dr. E. Green asked if any quantitative work had been done on the effect of moisture content of finished chocolate on its viscosity. Dr. Steiner of B.F.M.I.R.A., Leatherhead, commented on this by referring to the effects of moisture on the viscosity of chocolate. To characterize the flow properties of a concentrated suspension such as melted chocolate requires the use of two constants at least. At Leatherhead they had developed a procedure for determination of both *yield value* and *plastic viscosity* and were studying the effects of processing and composition on these constants. In general, moisture did not effect the yield value in the same

manner as plastic viscosity of chocolate. There were several commercial viscometers available which gave viscosity measurements at different shear rates and they had actually constructed their own viscometer to cover a range of shear rates suitable for measurements on chocolate. It was important to be able to make measurements at more than one rate of shear and this was in fact what was being done. Dr. Steiner asked Dr. Egli to explain more about the use of his flavour profiles for the evaluation of chocolate quality. It was known from experience that when the same samples are distributed to different tasters, it was quite common to find appreciably different responses. How did he deal with this situation, and how would he assess the significance of flavour profiles obtained on different samples?

Dr. Egli said that flavour profiles were used without statistical designs; zero was just detectable, two detectable, three pronounced but too much. There should be a big difference, or it was not of much use.

Dr. G. R. Howat said that it was interesting to note that on the question of flavour profile, the Cocoa, Chocolate and Confectionery Alliance had such a flavour profile panel for assessing chocolate as had been described by Dr. Egli. Unfortunately, it resulted in rather uncertain conclusions, as the representatives of different manufacturers tended to score highly for those factors which they valued, e.g. a floral flavour or a strong cocoa flavour. Furthermore, the presence of occasional foreign flavours, due to fermentation by moulds, gave rise to further difficulties.

Mr. S. H. Cakebread asked if Dr. Egli agreed with the statement that not all cocoa beans should be fully fermented, that is, a small proportion of under fermented beans should be present to emphasize desirable bitterness and astringency. Dr. Egli agreed that this could be so.

OXYGEN PERMEABILITY OF PACKAGING FILMS

Oxygen is known to have deleterious effects on a wide range of foods packaged in flexible film containers. It may be entrapped in the container during the filling and closing operations, or may enter subsequently by permeating through the container material. Oxygen permeability is therefore being studied by workers in the Division of Food Preservation, C.S.I.R.O., as it is an important property governing the choice of materials for the packaging of oxygen-sensitive foods. Some of these studies were reported previously in "*Foodpres News*" (No. 5, 1962; No. 9, 1963), but a fuller study has now been made of the effect of relative humidity (R.H.) on the oxygen permeability of a range of films based on regenerated cellulose.

Increases in oxygen permeability of over a thousand-fold were observed between zero and 92 per cent R.H. on cellulose films coated on one or both sides with nitrocellulose lacquer, and on other films coated on one side with nitrocellulose and laminated on the other side to polyethylene.

Some film materials were found to be less permeable to moist oxygen than the nitrocellulose coated materials. These include cellulose films coated on both sides with polyvinylidene chloride, and others coated on one side with this polymer and laminated on the opposite side to polyethylene. The observed increase in oxygen permeability of the polyvinylidene coated films between zero and 92 per cent R.H. was less than a hundredfold.

The observed effects of relative humidity on oxygen permeability emphasize the need to evaluate such materials under similar conditions to those encountered during commercial distribution and storage.

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BOOKS, PAMPHLETS, etc.

NEW F.A.O./W.H.O. REPORT ON FOOD ADDITIVES

The Seventh Report of the Joint F.A.O./W.H.O. Expert Committee has just appeared. This series of reports bears the general title, "*Specifications for the Identity and Purity of Food Additives and their Toxicological Evaluation*". The sub-title of the current report is "*Emulsifiers, Stabilizers, Bleaching and Maturing Agents*". Earlier reports covered "*Antimicrobial Preservatives and Antioxidants*" (Third and Sixth Reports), and "*Food Colors*" (Fourth Report).

These reports constitute an outstanding contribution to the food additive field. Not only are the listed substances defined in chemical terms and purity specifications given, but the toxicological data on which their safe use may be predicated have been presented and discussed in each case.

Of special significance and importance is the development in these reports of the concept of "*Acceptable Daily Intake Zones for Man*". This is defined as representing the limits of intake that can be regarded as presenting no significant hazard to health on the basis of the evidence available. For the guidance of users of food additives, this zone has been split into two parts. The first is termed the unconditional zone of acceptability and represents levels of use which can be safely employed without further expert advice. The second, or conditional zone of acceptability has been employed where overuse of the substance is a possibility or where the toxicological data may not be as complete as one would wish. The use of additives in this zone should be under expert guidance.

"RECENT ADVANCES IN AEROSOL RESEARCH"

A *Bibliographical Review* by C. N. Davies. 90 pages. Pergamon Press (Oxford), 1964. £1.10.0.

Aerosols are gases, usually air throughout which particles are distributed. They are not only of interest in the various branches of pure and applied research, but have applications in industry and elsewhere.

This work, by a member of the external scientific staff of the Medical Research Council, provides a bibliographical review of recent research papers in this field during the period 1957-62. Subjects covered include acoustic, ultrasonic and shock wave effects, adhesion of particles, chemical reactions, coagulation and diffusion, combustion, particle size and shape, filtration, aerosol generators, the optics of aerosols, radioactivity, sampling equipment, etc. It should be noted that the author has restricted his interest to research papers and that there is little or no reference to the applications of aerosols and only the barest mention of what is now popularly known as *the aerosol industry*. Essentially this is a book for the research worker studying fundamental properties.

"THE ABERDEEN TYPHOID OUTBREAK"

By Sir David Milne, et al. Departmental Committee of Enquiry, Scottish Home and Health Department. 74 pages. H.M. Stationery Office, Edinburgh. 1964.

"PROCESSING OF RAW COCOA FOR THE MARKET"

By A. Rohan. F.A.O. Agricultural Studies No. 60. F.A.O. Rome. 1963



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"SPRAY-DRYING AND INSTANT RECONSTITUTION"

("Zerstäubungstrocknen und Instantisieren")

By M. E. Schulz, 124 pages. Publishers Hans Carl, Nürnberg, 1963. D.M. 18.50 (in German).

A survey of instant reconstitution processes is given. For instant wetting and reconstitution the particle size in dried milk products should be between 30-100 μ . Differences in this respect between skimmed milk and whole milk powders are indicated. Information is also given on the effect of milk sugar on the behaviour of milk powders, air-currents of the atomizing mist in atomizing apparatus, electrostatic charge of milk powder, drying and instant reconstitution with additional use of foaming processes, important testing methods for determination of instant properties. A survey of the most important patents (according to patentees and countries) is included.

"TIN IN SOCIAL AND ECONOMIC HISTORY"

By S. Hedges. 210 pages. Edward Arnold (Publishers) Ltd., London. £2.0.0.

This book provides an interesting approach to social history which would appeal to the general reader as much as to the student of metallurgy, history or archaeology.

"PRODUCTIVITY IN RESEARCH"

"Productivity in Research" was the subject of a symposium organised by the Institution of Chemical Engineers in December, 1963, which has recently been issued as a publication. The symposium was concerned with the selection and organization of research from the point of view of those who direct it rather than with the use of research results in industry. The emphasis at the meeting was, therefore, on discussion and in conse-

quence a substantial part of this volume is devoted to reporting the points raised by the speakers, and the authors' answers to them.

The proceedings may be obtained from The Institution of Chemical Engineers, 16 Belgrave Square, London, S.W.1., price 60s.

"BUTTER ANALYSIS"

As a further item in its comprehensive programme of developing Australian standards relating to materials and test methods for dairy products, the Australian Standards Association has issued a series of standard methods for the chemical analysis of butter. The methods are set out in Australian Standard N45, which is an endorsement with amendments to suit Australian conditions of the 1961 edition of British Standard 769.

The standard lays down the procedure for the preparation of the sample, and gives methods for determining moisture, curd and salt, salt, curd, fat, titratable acidity, volatile acids, iodine value, saponification value, refractive index of butter fat, copper, iron, and pH of butter serum.

The price is 9/6 a copy.

"PROCEEDINGS: 5th ANNUAL RESEARCH CONFERENCE, DRIED FRUIT INDUSTRY RESEARCH ADVISORY COMMITTEE"

June 15th, 1964, Monterey, California. 35 pages. Davis., Calif. 1964.

A progress report on study of the influence of grape maturity on the quality and yield of raisins; Process and product research on dried fruits; Some factors affecting apple dehydration; Progress report on parallel- and counter-flow dehydration of prunes; Toxicology of ethylene oxide; Malathion as a protectant for raisins, inshell walnuts and almonds in storage; Occurrence of *escherichia coli* and other coliform bacteria in unshelled nut meats and Research advantage.

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BOOK REVIEWS

- "AGRICULTURE": *Volume III of the Science and Technology for Development. Report on the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas.* 309 pages. United Nations, New York, 1963. \$8.00.

This is one of the eight volume Report giving a narrative account of the U.N. Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas. It is an official report of the Secretary-General of the U.N. In substance it is comprehensive, embodying both the oral discussion and contributors' papers. In style it is non-technical: the aim has been to make this permanent record a readable one which will be widely studied and used.

The volumes of the series are entitled as follows: I: World of Opportunity; II: Natural Resources; III: Agriculture; IV: Industry; V: People and Living; Health Nutrition, Rural Development, Urbanization; VI: Education and Training; VII: Science and Planning; VIII: Plenary Proceedings, List of Reports and Papers and Index.

In this volume on Agriculture, chapters of special interest to food technologists deal with dairy technology, fisheries and fish handling, storing and processing agricultural products. Their significance is of course best appreciated in the context of the whole work which is divided into the broad areas of Development of Plant Resources, of Animal Resources and of the Framework, concluding with the industrialization of Agriculture.

The production of more food must be coupled with the reduction of losses that result from faulty harvesting and handling methods,

and above all from bad storage. But almost as important as the saving in quantity is the preservation of quality. In many areas people are traditionally accustomed to products more or less spoiled by insects. They often do not fully realize why such products command only low prices on the world markets or why, in some cases, they cannot be sold at all. Improvement of quality therefore means better opportunities for marketing and higher prices. It means also better health and better nutrition in so far as the stored produce is consumed in the country of origin.

The contributions which food technologists can make to the problem are given little prominence but to the initiated reader it must be obvious that shortage of educated food technologists in developing countries makes it futile to call for greater contributions to national welfare from them. Until there will be more of them, agriculturists must try to do their job. This text is an eye opener in this regard.

Reviewer: Professor F. H. Reuter, The University of New South Wales, Sydney.

- "PRINCIPLES AND APPLICATIONS OF RHEOLOGY", by ARNOLD G. FREDRICKSON. 326 pages. Prentice-Hall Inc., Englewood Cliffs, N.J. 1965.

The aim of this book is to introduce the engineer to the rheological properties of materials using the language of modern continuum mechanics. These properties are describable by equations of state which are invariant with respect to different frames of reference. An immediate consequence is that these equations of state must be tensor equations and this fact therefore de-



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finishes the mathematical framework of the book.

Those with a knowledge of only Cartesian tensors may get into difficulties since the author uses the more general tensorial concepts of covariance and contravariance. However, there is an excellent summary of these properties of tensors in the appendix along with handy equations for the *conversion* from Gibb's to tensor notation.

The theoretical foundations of deformation and flow and dynamics of continuous media are laid down in the first three chapters; the author's *modern* approach to rheology being illustrated by lucid treatments of convected co-ordinate systems and convected differentiation with time. The fourth and following chapters deal with the various rheological substances, *i.e.* those which may be purely viscous, purely elastic, linear or non-linear viscoelastic, or plastic. There is a brief chapter on viscometry and rheogoniometry and the book concludes with some engineering applications including transition and turbulent flow of non-newtonian fluids and viscous heating in poiseuille flow.

The treatments of these individual chapters are well-balanced and contain very complete references. Throughout, difficult mathematical points are illustrated by well-chosen examples. However there are some criticisms. In the chapter on linear viscoelasticity there is no mention of Bland's theory of a three-dimensional lattice model of a viscoelastic material, his name, only, is mentioned). Also there is the surprising omission of Biot's work on irreversible thermodynamics as applied to viscoelasticity. There is a certain amount of repetition in the discussion of the analysis of Bingham and Green in explaining the *Bingham plastic* properties of paint (see pages 21-22 and 175-177). The section on instrumentation is quite specialized since the author is only interested in those experimental methods which measure apparent viscos-

ity and normal stress effects. He deals with only three instruments in addition to jet devices, *viz.* capillary tube, couette and cone-and-plate with manometer. This gives the chapter an air of incompleteness since there are many other instruments capable of giving meaningful rheological information.

This book is an excellent summary of rheology from the phenomenological aspect. However the title is misleading for it is difficult to see how rheologists (experimentalists in particular) could apply the principles developed to describe the rheological properties of materials. The sophisticated level of the mathematical tools will deter all but the bravest.

Reviewer: W. J. Wallace, *Bread Research Institute of Australia, North Ryde, N.S.W.*



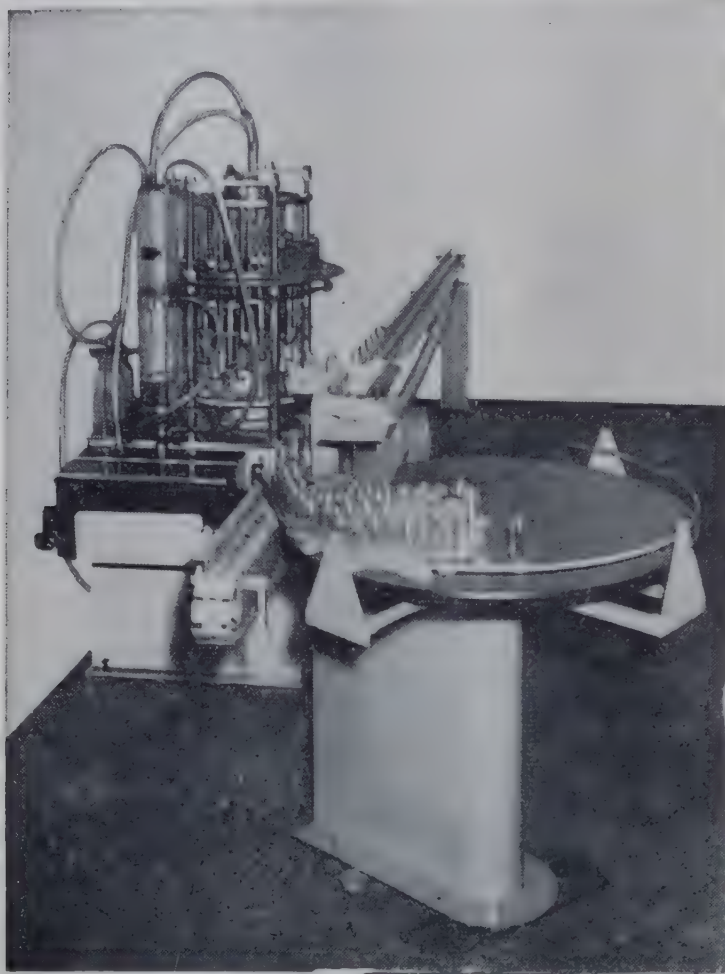
- "A TEXTBOOK OF DAIRY CHEMISTRY": Volume 2 *Practical*, by E. R. LING. 140 pages. Chapman and Hall Ltd., London, 1963. 25/-.

This book on practical dairy chemistry has become very widely known in quality control laboratories in the dairy industry. The text was originally written in 1944 to supplement Volume 1 which concerned aspects of the theory of dairy chemistry. The author intended the volumes for use in student instruction at college and junior university level and their success for this purpose is reflected by the publication of this volume which is the second printing of the third edition.

The author has not departed from the original layout of the first volume and contains chapters on elementary laboratory operations such as weighing and pipetting, the sampling of dairy products for chemical analysis, qualitative and quantitative methods of analysis for milk and milk products and separate chapters devoted to butter and cheese. The final chapter de-

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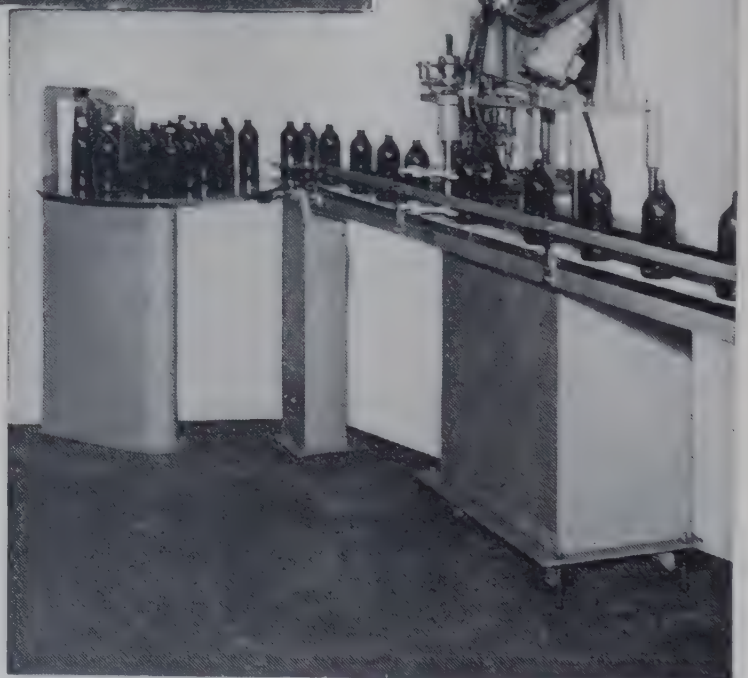
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scribes methods for the testing of detergent concentrations, and available chlorine strengths as well as techniques for checking the accuracy of thermometers, Gerber tubes, pipettes and lactometers.

The contents are not designed to provide a comprehensive coverage of practical dairy chemistry operations but serve a very useful purpose for rapid laboratory bench checking of points in technique.

The illustrations throughout the text are exceptionally clear even though some of them are outdated, e.g. the diagrams of balances do not include modern developments such as digital read out systems.

This text is well presented, of moderate cost and should continue to be in demand for dairy chemistry instructional and laboratory purposes.

*Reviewer: Dr. Ross J. Richards,
N.S.W. Department of Agriculture,
Rydalmere, N.S.W.*

- "I.C.U.M.S.A. METHODS OF SUGAR ANALYSIS", by H. C. S. DE WHALLEY (Ed.). 148 pages. Elsevier Publishing Co. Ltd., Amsterdam. 1964. £2.5.0.

The late H. C. S. de Whalley, who died just before this book went to press, has performed a notable service for the world's sugar analysts in accumulating in one volume the essence of the work of the International Commission. This volume remains a memorial to a man who devoted much of his life to improving and standardizing analytical methods for the sugar industry.

The book sets out in a detailed but straightforward way the instructions for the methods given. Each is clearly shown as being the official or tentative method, or, where not even a tentative method can be recommended, a method, still being investigated, is shown for guidance only. The methods are classified as general methods, e.g. reducing sugars, ash, etc., and special methods, e.g. those concerned with raw

sugar polarization, evaluation of refining qualities of raw sugar, evaluation of refined (white) sugar.

On the subject of raw sugar polarization, which is of considerable commercial interest all over the world, the editor has felt able to say relatively little. There are some minor departures from the text of the method as published in the I.C.U.M.S.A. Proceedings (1958 and 1962 Sessions), and those interested in the subject are advised to refer to the I.C.U.M.S.A. publications. The author has included only one of the two I.C.U.M.S.A. tentative procedures for raw sugar polarization. The method described is, certainly, the one in widest use, but it is, perhaps, a pity that the second method, which is particularly useful in large modern laboratories with automatic polarization equipment, was not referred to.

The accumulation of the I.C.U.M.S.A. methods in one volume makes for ease of reference and the editing of contributions of selected committee members by H. S. C. de Whalley ensures its authoritative character. As such it is a book which is sure to be in demand by sugar analysts everywhere.

*Reviewer: J. E. S. MacPherson,
C.S.R. Co. Ltd., Sydney.*

WORLD'S POULTRY CONGRESS

The 13th World's Poultry Congress will be held at Kiev, Russia, from August 15-21, 1966.

Papers to be submitted will deal with Genetics and Breeding, Nutrition, Physiology, Diseases and their Control, Poultry Management and Poultry Buildings, Incubation and Embriology, and Economics and Marketing. There will also be symposia on urgent poultry problems.

Additional information regarding the Congress is obtainable from the Secretary-General, XIIIth World's Poultry Congress, 509 room, 1/11 Orlikov pereulok, Moscow, 1-139, U.S.S.R.

DAIRY TECHNOLOGY

Cream Export in Plastic Containers

A N.Z. dairy co-operative has switched to oblong plastic containers for exporting frozen cream to the U.S.A.

The change was made after it was found that the blow-moulded containers saved a considerable amount in freight costs.

The company exports frozen cream to the United States where it is used in the manufacture of soups, ice creams and other foods.

New Products and New Presentation

NEW DAIRY PRODUCTS

A new product, or an improvement on an old one, will partly replace existing products, but in a commercial success the net effect must be a substantial increase in total sales. Only a limited number of things can be done with milk constituents so in the development of a commercial success awareness of consumer needs must be combined with a wide and deep knowledge of the range of properties that can be conferred on milk constituents by various processing methods. Modified milk powders for use in bread and to replace egg albumin, butter concentrate, special diet foods, and recombined products have been developed to meet special needs.

Projects still under consideration by the C.S.I.R.O., Division of Dairy Research, and upon which more work is being done are: milk-protein biscuits, curd products as meat substitutes, high protein milk powder, a cheese that can be fried, modification of cheeses by inclusion of substances in milk before coagula-

tion, drying of dialyzed concentrated milk, a recombined cream for whipping, butteroil for cakes, powdered or concentrated egg nog, milk and cream tablets, yoghurt tablets.

Butter powder is a product developed to deal with surpluses and a little more work is needed before it will be in commercial production.

R. A. Buchanan, "Aust. Soc. Dairy Technol. Tech. Pub.", No. 14, 29 (1964).

Golden Staph in Cheese?

Tests were made to determine the effect of manufacturing procedures for specific varieties of cheese on the growth and survival of *Staphylococcus aureus* (FM 31) organisms added to milk at the start of the process. The staphylococcal count was approximately 1×10^6 /ml milk.

Cheddar, Colby, Swiss-type, Limburger, and Cottage cheese by two methods were made. Conditions of manufacture of each variety were favourable for the growth of *S. aureus* and significant increases occurred at specific stages. In general, the organisms were concentrated in the curd and increased in number until the cheese was salted. After pressing the curd, another increase might occur during the first 21 days of ageing. A decrease would then take place, which generally continued throughout ageing. At no time, however, did the *S. aureus* count become zero during ageing. Staphylococci were not recovered from fresh Cottage cheese after it had been cooked at 130°F for 40 min. at pH 4.5.

However, when the curd was stored dry or creamed for ten days at either 40 or 50°F, viable *S. aureus* organisms were recovered. Nevertheless, the manufacturing procedure for Cottage cheese was the only effective one in destroying *S. aureus*.

"Relation of Cheese-making Operations to Survival and Growth of *Staphylococcus aureus* in Different Varieties of Cheese", S. L. Tuckey, M. E. Stiles, Z. J. Ordal, L. D. Witter, "J. Dairy Sci.", (47, 604, 1964).

Butter Powder

For the formation of a typical butter powder, as developed by the C.S.I.R.O. Division of Dairy Research, homogenized 62% fat cream containing 0.75% added sodium citrate is mixed with a skim milk dispersion of acid casein and glycerol mono- and distearate with NaOH, and the mixture containing 58-59% solids is forewarmed at 65.6°C before being spray dried and cooled, sodium aluminium silicate being added to make the powder free-flowing. The non-fat fraction of the powder may be varied to suit any particular use. The powder's keeping quality is improved by the addition of 0.016% B.H.A. antioxidant.

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Relationship Between the Swift Test Time and the Keeping Quality of Butterfat

The oxidative stability of butterfat was examined by the Swift or active oxygen method. The range of Swift times from 43 samples of choicest Victorian butter was 12 to 24½ hours. The addition of 0.01 per cent dodecyl gallate or nordihydroguaiaretic acid to butterfat markedly prolonged Swift times but gave comparatively small increases in keeping quality at room temperature. The Swift values were not influenced by the grade or age (up to 6 months) of butter and within the range 12 to 22½ hours they were not correlated with the keeping quality of butterfat or of shortbread biscuits containing butterfat.

B. G. Pont, "Aust. J. Dairy Technol.", (19, 108, 1964).

•

Ice-cream Low in Phenylalanine and in Salt

Commercial ice-cream in Australia contains about 0.21 per cent of phenylalanine and 0.11 per cent of sodium chloride which are too high for it to be included in diets for phenylketonurics or for patients

requiring very low salt intake. A formula is presented that provides an ice-cream low in these constituents, attractive in flavour and texture, and readily prepared in home or hospital.

R. A. Buchanan, "J. Dietet. Ass. Vict.", (15, 4, 1964).

•

THE APV-S.E.F.F.A.C. CONTINUOUS CHEESEMAKING PROCESS

The Hutin continuous cheese-making process has become the subject of an agreement between the A.P.V. Company and a newly-formed company known as S.E.F.F.A.C. (Societe d'Equipment de Fromagerie pour la Fabrication en Continu) of Paris.

The process is used both in France, where it has been applied commercially in more than one soft cheese factory, and in England where trials on Cheshire and Cheddar cheese have taken place. The process involves the use of concentrated milk which has been evaporated under carefully controlled conditions. Starter is added to the concentrate which, after a suitable ripening period, is diluted with warm water before renneting. High yields are obtained by this method, due principally to the retention in the curd of milk solids which are usually lost in the whey.

The prototype APV Paracurd 600 machine for continuous curd production incorporates the concentration and dilution technique. With a capacity of 600 litres/hr. this machine will be used for experimental work and, providing tests continue successfully, it is expected to have full-scale commercial Paracurd plants available by early 1966.

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THE FOREMAN IN THE FOOD PLANT

The Food Technology Association of N.S.W. (a Division of the Chamber of Manufactures of N.S.W.) in conjunction with Hawkesbury Agricultural College will conduct a Winter School entitled "*The Foreman in the Food Plant*" from Monday, 30th August, to Friday, 3rd September, 1965, inclusive.

The lectures are designed for personnel in the food processing industries at the supervisory level, and are aimed at providing an appreciation and understanding of their responsibilities and duties in the food industries. It will be noticed that this year there is an emphasis on industrial relations.

The course will be held at the Hawkesbury Agricultural College, which is 39 miles west of Sydney in the Hawkesbury valley at Richmond, where accommodation will be provided. Each student will have his own room, and is to enrol on Monday, 30th August.

Recreational facilities at the College include tennis courts, a billiard room, and gymnasium, all of which are available for student usage.

The fee for the course is £25 inclusive of accommodation, and should be forwarded to The Secretary, Food Technology Association of N.S.W., 12 O'Connell Street, Sydney. Cheques should be made payable to Food Technology Association of N.S.W.

Applications close Friday, 13th August, 1965, and as the School is being limited to forty students, members are urged to complete and return the application form at the earliest convenience.

PROGRAMME:

MONDAY, AUGUST 30, 1965

9 a.m. to 12. ENROLMENT.

12 noon. LUNCH.

FOOD TECHNOLOGY IN AUSTRALIA, August, 1965

1 p.m. to 1.30 p.m. Welcome to College, B. Doman (Principal H.A.C.).

Afternoon: Official Opening, Dr. V. M. Lewis (President F.T.A. of N.S.W.). "*The Functions of a Foreman*", V. Norman (School of Management, Sydney Technical College). TOUR OF COLLEGE.

Evening: SCHOOL PERSONNEL — Self Introductory Session. SOCIAL.

TUESDAY, AUGUST 31, 1965

Morning: "*General Food Preservation Methods*", P. A. Baumgartner (Mayfair Hams & Bacon Co. Pty. Ltd.). "*Quality Control — Principles and Practice*", R. Higgins (Gordon Edgell Pty. Ltd.). "*Micro-organisms and Food*", G. Greethead (Streets Ice Cream Pty. Ltd.).

Afternoon: "*The Foreman and Factors Affecting Cost*", J. Allan (Harry Peck & Co. (Aust.) Pty. Ltd.). "*Chilling and Freezing*", J. J. Budge (James Budge Pty. Ltd.). "*Handling and Transport of Frozen Food*", J. Last (C.S.I.R.O., Division of Food Preservation).

Evening: TECHNICAL FILMS.

WEDNESDAY, SEPTEMBER 1, 1965

Morning: "*Principles and Practice of Heat Sterilization*", P. Board (C.S.I.R.O., Division of Food Preservation). "*Soaps, Detergents, Microbiocides*", A. Twomey (Hawkesbury Agricultural College). "*Materials and Equipment for Good Hygiene*", R. Evans (Mauri Bros. & Thomson Ltd.).

Afternoon: "*Vermin Control*", W. Madgwick (N.S.W. Department of Health). "*Raw Materials Hygiene*", C. Sawkins (H. J. Heinz & Co. Ltd.). "*Sanitation Programmes and their Implementation*", J. Russon (Diversey (A/asia) Pty. Ltd.).

THURSDAY, SEPTEMBER 2, 1965

Morning: "*Planning in Daily Production*", P. Gibson (Harry Peck & Co. (Aust.) Pty. Ltd.). "*Materials Handling*", W. Hopkins (H. Jones & Co. (Sydney) Pty. Ltd.). "*Job Training*", W. R. Widerberg (Australian Consolidated Industries Ltd.).

Afternoon: "*Good Housekeeping and Safety*", C. D. Sealie (Streets Ice Cream Pty. Ltd.). "*Methods Study*" (with particular reference to weak point detection and correction), A. Legget (Australian Sisal-kraft Pty. Ltd.).

Evening: TECHNICAL FILMS.

FRIDAY, SEPTEMBER 3, 1965

Morning: "*The Foreman and Industrial Relations*", N. J. Mason (Chamber of Manufactures of N.S.W.). "*The Foreman and Industrial Psychology*", Miss P. Griffin (Bradford Cotton Mills Ltd.). Official Closing, M. E. Jones (Vice-President F.T.A. of N.S.W.).

Improving Canning Peach Varieties

By M. C. STANNARD,
N.S.W. Department of Agriculture

New and better canning peach varieties are under evaluation at Yanco Agricultural Research Station, N.S.W. This station is fulfilling an important role in breeding, selecting and testing of new varieties for the Murrumbidgee Irrigation Areas, in which are planted some 4,500 acres or 96 per cent of the New South Wales canning peach total.

New varieties are needed to spread the harvest season so that a continuity of supply to canneries is assured, thus avoiding excess peak deliveries to processing plants. Although there is a range of varieties maturing from January to April, most of these have some undesirable canning or agronomic characteristics. As a result the best variety, Golden Queen is very much favoured and comprises about 40 per cent of the plantings. With its heavy cropping capacity a substantial peak delivery to the canneries occurs early in March. This could be avoided by the planting of better selections maturing at different times.

At Yanco, breeding and selection programmes are in progress. Additionally, introductions from other States, the U.S.A., and Transvaal Seedling types from South Africa are tested.

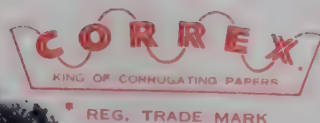
New varieties sometimes occur as chance seedlings and a particular example is Golden Queen which originated in New Zealand. Selection of seedlings from both open and controlled cross-pollinations are two methods used at Yanco to find other varieties suited to the locality. Resultant types provide a wide range in the time of ripening.

Bud-sport mutations also occur but these often revert to the original. Mutations usually vary only in one characteristic from the parent, such as in time of maturity. Several Golden Queen sports have been tested; one of these, Yanco Queen, shows considerable promise, but testing for reversion is essential before release as a recommended variety. Where reversion occurs, a planting could exhibit a patchy ripening pattern, and cause considerable inconvenience to the grower.

The type of canning peach required needs to fulfil certain criteria. For the canneries, a good bright flesh colour and even shape, with centrally placed pit or stone is desirable. A large flange or prominent tip on the stone, or red flesh colour around the stone should be avoided. Green tinge in the shoulder is detrimental to appearance in the can. Texture, flavour, and firmness are other aspects to be considered.

Together with good quality, a variety needs good field characteristics such as a consistently high cropping and hanging ability without heavy immature drop. It should not be prone to excessive disease incidence, stone splitting or limb breakage.

Before a firm recommendation is made, varieties are assessed at canning peach conferences, where research workers and industry representatives compare relevant data. This information is obtained from canned samples, observation blocks and variety trials which are included in the expanding programme of the N.S.W. Department of Agriculture at Yanco. Further aspects on performance are obtained from



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grower plots established to test performance in other parts of the district.

For breeding and selection work at Yanco there are some three hundred varieties, crosses, or seedlings which may be found useful, perhaps not always as straight varieties but as parents of new varieties.

It is perhaps unfortunate that as a community we spend our time chasing publishers who seek to sell us a copy of "*Jenny Hill*" while we ignore completely the vast quantity of nutritional misinformation which is published.

— J. C. McKenzie*

*"Chem. & Ind.", 23/1/65, p. 155.

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FROZEN FOOD LABELLING MANUAL

The American National Association of Frozen Food Packers has issued the first labelling manual ever designed specifically for frozen food products. This new manual, is a reliable reference that is well cross-indexed on things to do and things to avoid the next time labels are subject to review or new labels are being designed. Its recommendations can be followed with confidence, because each is a majority consensus.

The manual was prepared by N.A.F.F.P.'s Task Force on Labelling and Packaging. It calls for the placement of essential and helpful information on three consecutive panels so that the shopper will always know where to find the information she seeks. The three panels are designated as:—

- (1) The Shopper's Panel (main display panel) which is to carry the product name, nett quantity, and name of packer or distributor, plus informative terms about the style, size, tenderness, variety, quality, freezing, and Kitchen-ease of the product (ready to cook, precooked, prebaked, etc.).
- (2) The Composition Panel (front riser panel) where the statement of ingredients is to be made, and
- (3) The Family Panel (bottom of package) where helpful information is to be presented on handling the product, opening the package, cooking or preparing the product, innovations for serving, number of servings, and nutritional quality.

The manual is an outgrowth of the industrywide labelling survey conducted by N.A.F.F.P. in early 1963. At that time, the Association collected some 2600 labels for nearly 400 frozen food products from its packer members and from a number of the nation's top food chains. An evaluation of these labels enabled the Association to establish

a set of voluntary guidelines on minimum type sizes for quantity declarations. These were presented earlier this year to a sub-committee which was preparing recommendations on quantity declarations for the National Conference of Weights and Measure Officials meeting in June, 1964. Although not adopted by the sub-committee, they are very close in most respects to the guidelines selected by the committee.

The manual, which was distributed to N.A.F.F.P. packer members and Associate members involved in labelling design, is a 200-page loose-leaf encyclopedia of labelling for well over 2000 kinds and styles of frozen foods from apple pie to Zucchini.

Personal . . .

Dr. R. V. Holland has been appointed to the C.S.I.R.O. Division of Food Preservation where he will study the chemical properties and structure of tinplate, the interactions between food and tinplate, and specific problems of corrosion.

Mr. S. L. Sherlock, who graduated B.Sc. from the University of New South Wales last year, has been appointed to the C.S.I.R.O. Division of Food Preservation where he will work on the statistical design and analysis of the Division's experiments.

The appointment is announced of *Mr. John M. Kinsey* as Technical Director of W. J. Bush & Co. (Aust.) Pty. Ltd. Mr. Kinsey graduated with a Fellowship Diploma in Applied Chemistry R.M.I.T. and is an Associate of the Royal Australian Chemical Institute. He joined W. J. Bush & Co. (Aust.) Pty. Ltd. as Chief Chemist in 1954 and was appointed Associate Director of the Company in 1959.

TEXTURE OF CANNED SOLID PACK APPLES

Studies have recently been completed at the Research Station, Summerland, British Columbia, regarding the effects of several factors on the texture of solid pack apples. The effect of freezing was investigated because apples occasionally become frozen in shipment or storage. Newtown apples were held at 22°F for 12, 24, and 36 hours before peeling, slicing and canning as solid pack. The texture of the processed slices was measured with an electronic shear press and compared with the texture of canned slices prepared from unfrozen apples. As the holding time at 22°F was increased, texture of the processed slices became significantly ($p = 0.01$) softer.

The effects of the gas removal-blanch method on the texture of processed apples was studied in an experiment of 4×4 factorial design with four replications; the texture was again measured by shear press. The results showed that the four gas removal and blanch treatments tested were significantly ($p = 0.01$) different from one another. In order of decreasing firmness of product the treatments may be rated as follows:—

Ten minutes under 28½-inch vacuum followed by three minutes 180°F water blanch;

Ten minutes under 28½-inch vacuum followed by three minutes 210°F steam blanch;

Ten minutes under 28½-inch vacuum followed by three minutes 210°F water blanch;

Overnight soak in two per cent salt followed by three minutes 210°F steam blanch.

The best texture was obtained with the low temperature water blanch following vacuum deaeration, but in order to ensure enzyme inactivation a higher blanching temperature was desired. Accordingly,

to determine the most suitable temperature a further experiment was performed in which ten samples were prepared at each of four blanch temperatures: 180°, 190°, 200° and 210°F. Analysis of variance of shear press readings on these products indicated that the slices blanched at 180° and 190°F were not significantly different but those blanched at 200° and 210°F were significantly softer. It is therefore recommended that vacuum processed apple slices should be processed by water blanching at 190°F.

F.T.A. of N.S.W.

N.S.W. Management Committee Representation

Legal advice concerning the interpretation of Clause 40 stated:—
“Our advice is sought as to the interpretation of clause 40 of the Rules, which provides that ‘A representative of a member being a firm or corporation shall be eligible for election or appointment to the Management Committee but no more than one of the partners directors officers or representatives of any one firm or corporation being a member shall be eligible for election or appointment to the Management Committee’.

“In the circumstances which you mention of several Companies all being the subsidiaries of one parent or holding company, this factor does not prevent each Company, being a member, appointing its own representative to be a member of the Management Committee. Each of such subsidiary companies is nevertheless a legal entity and, as such, a member of the Association and entitled individually to exercise the rights of a member.”

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LIQUID NITROGEN IN DISTRIBUTION OF FROZEN FOODS

Frozen food delivery vans, kept at proper temperature by controlled sprays of liquid nitrogen, after a long period of experimentation have suddenly caught on in the U.S.A. It is now estimated that 2,000 trucks are using a liquid nitrogen system in preference to other methods of keeping adequate temperatures, 1,500 of them by arrangement with the Linde Division of the Union Carbide Corporation, New York.

The most prevalent method of truck refrigeration is the use of a mechanical gasoline operated compressor, the second most prevalent method is the employment of dry ice in a well-insulated truck, and the third is the use of insulated containers which are mixed with non-refrigerated goods.

The advantage of the liquid nitrogen system is that it can restore a reasonably safe temperature within a few minutes after the door has been opened for a delivery, because it sprays a very low-temperature gas directly on the containers.

The liquid nitrogen system also has the advantage that it cannot break down because it has no moving parts. It is primarily a storage tank holding a supply of liquid nitrogen under pressure which is forced out of a nozzle in a spray when the release mechanism is activated either automatically or manually.

Since liquid nitrogen is -372°F , the reason why it can lower the temperature of the load quickly becomes obvious.

There are also disadvantages to the system. The liquid nitrogen system will cost more than the operation of a mechanical unit. However, it has been found that if minimum levels of critical temperature levels

are established and the unit is set to maintain such a level and not drop the temperature down below what is absolutely needed to ensure safe delivery, costs can be kept in perspective. At the same time the capacity exists to take care of any emergency of temperature need.

SUPPLY OF LIQUID NITROGEN

The matter of supply of additional liquid nitrogen can be a problem in over-the-road trailer hauls, because depots selling liquid nitrogen are not common. This is no problem in local delivery by a distributor, because a large storage tank is provided on the warehouse premises which supplies the trucks as needed.

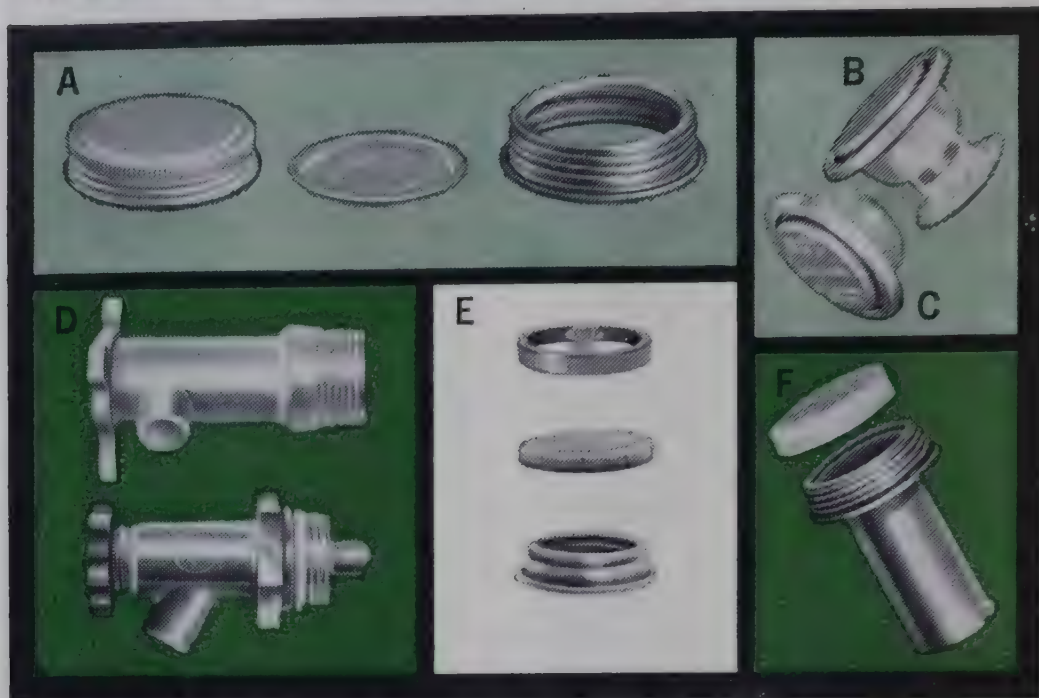
The imposition of frozen food handling codes in State after State in America has caused frozen food distributors when buying new fleets of trucks to look carefully at liquid nitrogen truck refrigeration, and the numbers switching in that direction are enough to be termed a *trend*. The method could be very frustrating for State inspectors checking truck temperature, because once the driver was aware that he was being approached by an inspector a twist of a lever could drop the temperature of the truck as low as desired before the door could be opened and the load temperature checked.

From "Frozen Foods".

Food Science:— the body of organized knowledge that is concerned with the "understanding" of the composition of food; food technology is exploitation of that knowledge in practical terms.

— E. C. Bate-Smith

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F Tinplate pull-up pourer gives easy dispensing with heavy duty extension pourer.

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Made strictly to established Australian standards, Rheem accessories ensure the exact fit of precision mated parts.

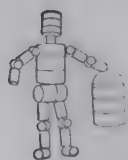
The complete range of Rheem accessories is available in best quality materials including die-cast zinc alloy, stainless steel, tinplate and plastic.

Selection of these high-grade materials prevents leakage or contamination of the product and gives economical long life to the accessories.

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The Packaging of Salted Peanuts

Salted peanuts are representative of a class of foods which are sensitive to oxygen and moisture. Oxygen affects flavour by promoting rancidity reactions in the fatty components, and moisture pick-up results in loss of texture.

At the request of the Queensland Peanut Marketing Board, the C.S.I.R.O. Division of Food Preservation has investigated the protective properties of a range of package materials as containers for salted peanuts. The investigations were designed to study by laboratory test methods the water vapour and oxygen permeability properties of the package materials, and to correlate results of these tests with the changes in texture and flavour of test packs of salted peanuts during storage at controlled conditions of temperature and humidity.

Salted peanuts have a firm crisp texture when freshly processed, but moisture pick-up causes loss of crispness and they tend to become tough and slightly resilient. Changes in texture and moisture content of test packs of salted peanuts were followed during storage at 77°F, 65 per cent R.H. Texture, measured by a taste test panel, was found to be unacceptable above a moisture content of 4.5 per cent (wet basis). Based on this level, 1 oz test packs of salted peanuts (initial moisture content approx. 2 per cent) stored at 77°F, 65 per cent R.H. in pouches with a surface area of 30 in² and water vapour transmission rates of 0.03, 0.13, and 0.22 g/100 in.², 24 hr at 77°F, 65 per cent R.H. gave shelf-lives of 26, 9, and 2 weeks respectively. The texture of kernels packaged in moisture-impermeable tinplate cans showed no significant decline during storage for 24 weeks.

The effects of changes in R.H. at 77°F and temperature at 65 per cent

R.H. on the water vapour transmission rate of pouches made from five types of flexible film material were determined to provide a basis for the prediction of package performance over a range of storage conditions.

The studies also showed that changes in texture of salted peanuts may be followed by an objective method based on a ring-spring maturometer developed in the C.S.I.R.O. Division of Food Preservation laboratories (Mitchell, R. S., Casimir, D. J., and Lynch, L. J. (1961). "*Food Technology*", 15 (10), 415-418). The maturometer measures the resistance of solid foods to puncture by a series of blunt steel pins, and the results from this instrument showed a highly significant correlation with the taste test panel scores for texture.

Changes in flavour of the kernels were determined by a taste test panel at intervals during storage at 77°F, 65 per cent R.H. Flavour loss of the nuts stored in oxygen-impermeable tinplate cans was not significant after six months storage, but the shelf-life of kernels in flexible film pouches was related to the oxygen transmission rate of the pouch materials. Pouches with a surface area of 30 in.² packed with 1 oz nuts and made from films with oxygen transmission rates of 85, 67 and 8 cc(STP)/m², 24 hr (76 cm Hg) at 77°F, 65 per cent R.H. maintained satisfactory flavour for 24, 8 and 2 weeks respectively.

The effect of relative humidity on the oxygen transmission rate of materials based on regenerated cellulose has been studied (Davis, E. G. (1964). "*Austn. J. Appl. Sci.*", 15 (4) in press), but little information is available on the effect of temperature on the oxygen permeability of these materials.

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Salmonella Contamination of Meat

By L. N. THORNTON,

Chief Veterinary Officer, Department of Primary Industry, Melbourne

Salmonellae are but one of the many kinds of bacteria commonly found in the intestinal tracts of animals. While salmonellae infection of the intestine often causes an acute illness, this is not necessarily so, and many apparently healthy animals continue to excrete large numbers of salmonellae. There are hundreds of different kinds of serotypes of salmonellae which can be recognized by serological tests in the laboratory. While some types are restricted to particular hosts, others have the ability to multiply in several kinds of host animal. For example *Salmonella typhi*, the cause of human typhoid fever, is restricted to man, whereas *S. typhi murium*, the cause of mouse typhoid, is a common cause of infections in cattle, pigs, poultry and man as well as in rats and mice.

WHY ARE THEY IMPORTANT?

Evidence for the importance of salmonella contamination of foods has been accumulating in recent years, and there is now proof that human salmonella infections have sometimes been due to the consumption of infected meats. In other cases meat was probably the vehicle of infection, although final proof was lacking. While some cooking procedures would destroy salmonellae, the temperatures reached in the centres of grilled and roast meats would often be inadequate. Contaminated meat supplies can also be important as a means of infecting other foods in which salmonellae can multiply. This is particularly important in food manufacturing as cross contamination of large quantities of food may ensue. These may then be widely distribut-

ed to many thousands of consumers throughout the community. Methods for the elimination of salmonellae from foods are, therefore, likely to acquire increasing importance in the future.

FREQUENCY OF CONTAMINATION

There is to date only limited evidence about the percentage of Australian meat samples found to contain salmonellae. One report showed that 11 of 103 samples of retail meats purchased in Adelaide contained salmonellae. There is also evidence from the United Kingdom where extensive testing of imported and home grown meats has been undertaken. Boneless meats for human consumption imported from various countries between 1961 and 1963 were tested in London, and almost 16 per cent of 3400 samples contained salmonellae. The incidence in veal, beef and mutton was not very different. Of the above samples some 270 were of Australian products and in these about 7 per cent contained salmonellae. There was evidence of considerable variation between the meats from different abattoirs, and for 17 meat works in the Argentine the percentage of beef samples containing salmonellae varied from 0 to 55 per cent. In about half the meatworks the values were 20 per cent or greater. Of all retail meats purchased in England some 2 per cent were positive, most of these samples being from home killed meat.

CONTROL MEASURES

According to the origin and type of infection, different forms of con-



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trol measures may need to be used. Firstly, it is known that the percentage of infected animals is often very much greater at the time of slaughter than when the animals leave the farms. Conditions of transport and holding prior to slaughter may, therefore, need to be carefully controlled if cross infections are to be avoided. At the time of slaughter many infected animals may contain salmonellae only in the intestines; some may have infection in other tissues. In either case there is great need for the second type of control measure, the use of hygienic precautions to prevent carcasses being contaminated by intestinal contents, and to prevent the transfer of organisms from one carcass to the meat obtained from other carcasses. The spread of infection during meat cutting and boning operations when equipment inevitably acquires some micro-organisms from the meat which it touches. Care should be taken to ensure that salmonellae have no opportunity to multiply on equipment where they may lodge or in any of the products.

A third line of attack would be the use of some treatments which would destroy salmonellae in meats already contaminated. Heat treatments would, of course, be effective if they were feasible. Irradiation is an alternative treatment which may be possible, further work would however be needed to determine suitable processes.

PRESENT NEED

There is need for more information on the occurrence of salmonellae in Australian meats. It is important also to determine the origin of these organisms under the conditions now obtaining in the industry. Such information will provide a sound basis for measures which can be used to reduce this type of contamination.

Last year W.A. shipped 1,800,000 bushels of apples in cell-pack and tray-pack cartons.

THE LOW-CAL MARKET

RANGE OF FOODS COULD FOLLOW SOFT DRINKS

Problems which are encountered when cyclamates are used to replace sugar in soft drinks are described in a paper by J. J. Brennan and N. Leffler, in *"Food in Canada"*, (24 (6), 23, 1964).

For instance, flavours sometimes have to be rebalanced as cyclamates can bring out certain flavour notes; a high acid-proof caramel colouring must be used as that with a high calcium content may precipitate with calcium cyclamate. Natural pectins tend to gel with calcium, therefore they should be hydrolyzed or removed before using cyclamates to flavour the drink. Silicates in the water may precipitate as calcium silicate which is very insoluble: this occurs if bottles are left in a soaker too long or not rinsed properly.

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PACKAGING AWARD

Gordon Edgell Pty. Ltd. has been awarded first prize in the Food Section of the annual Consumer Pack Competition sponsored by the National Packaging Association of Australia.

The Gordon Edgell entry, representative of Edgell's new range of labels for canned vegetables and soups, was designed by Gordon Edgell's Packaging Division, and produced by Troedel & Cooper Pty. Ltd., Melbourne.

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Above is an architect's impression of the new meat research laboratory to be built for the Division of Food Preservation at Canon Hill, Brisbane. It will be built about two miles from the Division's present meat research laboratory which was established more than thirty years ago. The new laboratory, which was planned by the Head Office Buildings Branch, will be of two storeys and will have a floor area of about 27,000 square feet. It will consist of two parallel laboratory blocks (run-



Proposed C.S.I.R.O. Meat Research Laboratories at Cannon Hill, Brisbane, Queensland.

ning from left to right in the above picture) linked by an administration and amenities block containing a library, offices, and mechanical plant. The Australian Cattle and Beef Research Committee has provided £224,000 and the Commonwealth Treasury £26,000 for stage one of the building. Stage one will consist essentially of one labora-

tory block and half of the administration and amenities block. The Commonwealth Department of Works is now preparing working drawings and specifications, and it is expected that the construction of stage one will commence about August this year and will take about eighteen months.

A food technologist, if he is to justify that title, must be a scientist.

— Magnus Pyke

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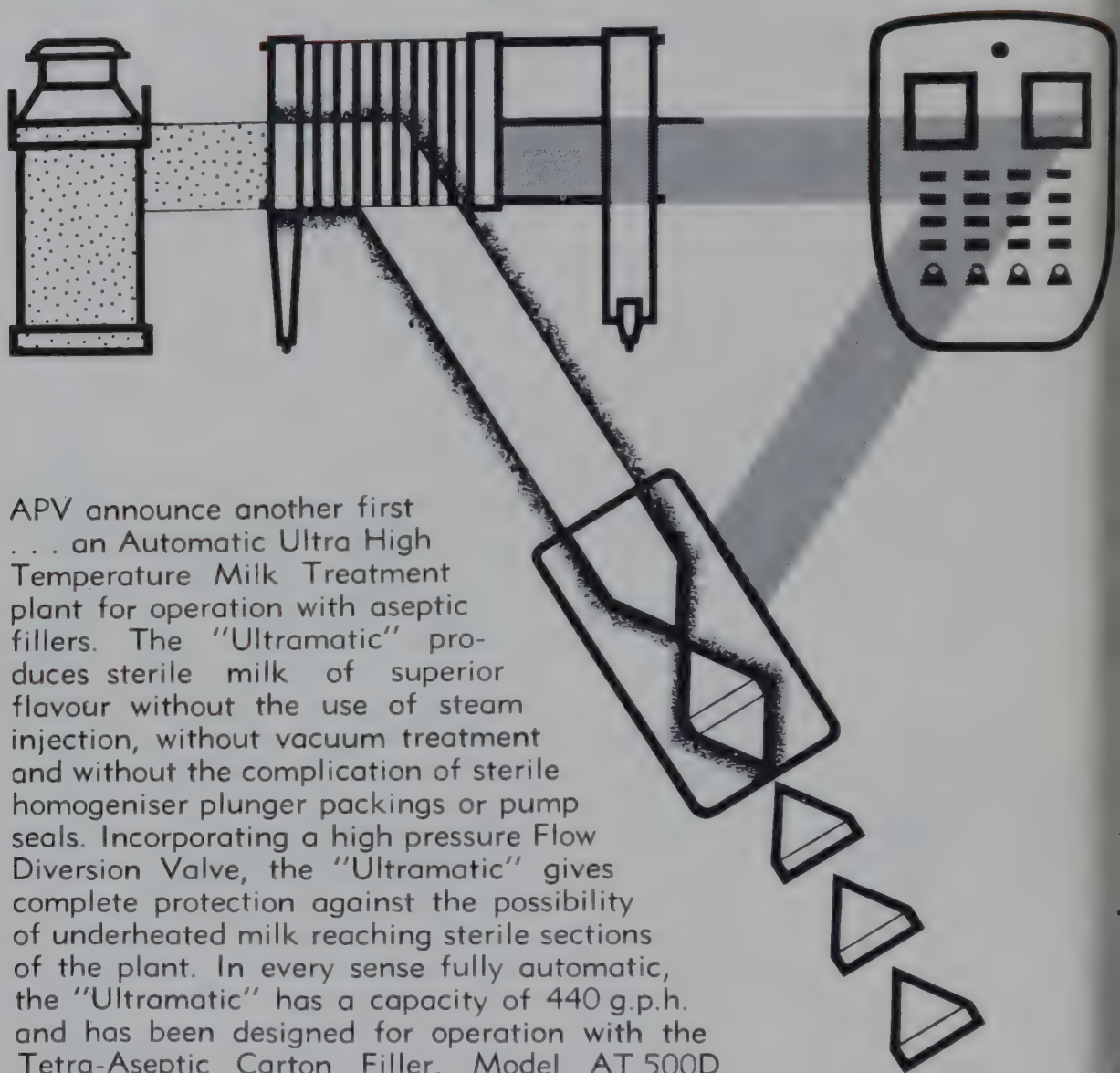
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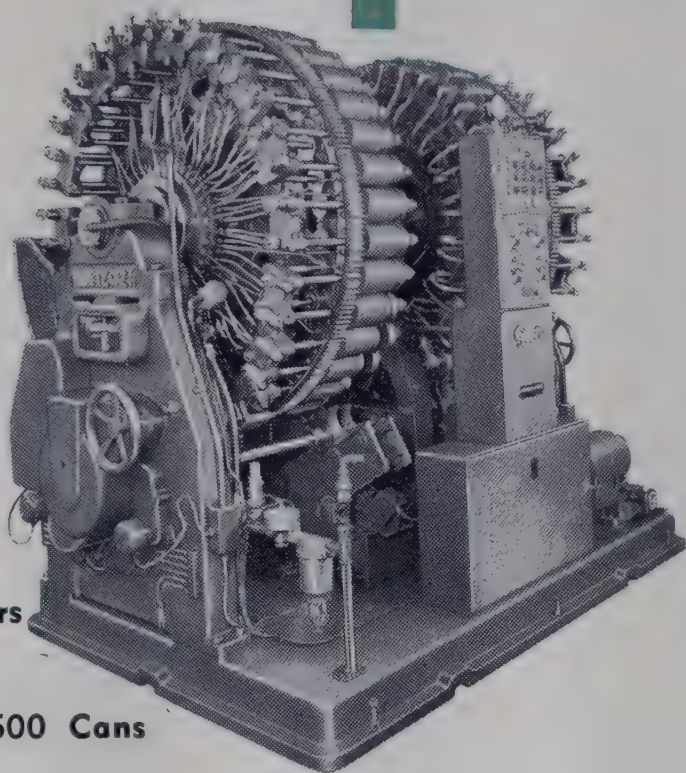
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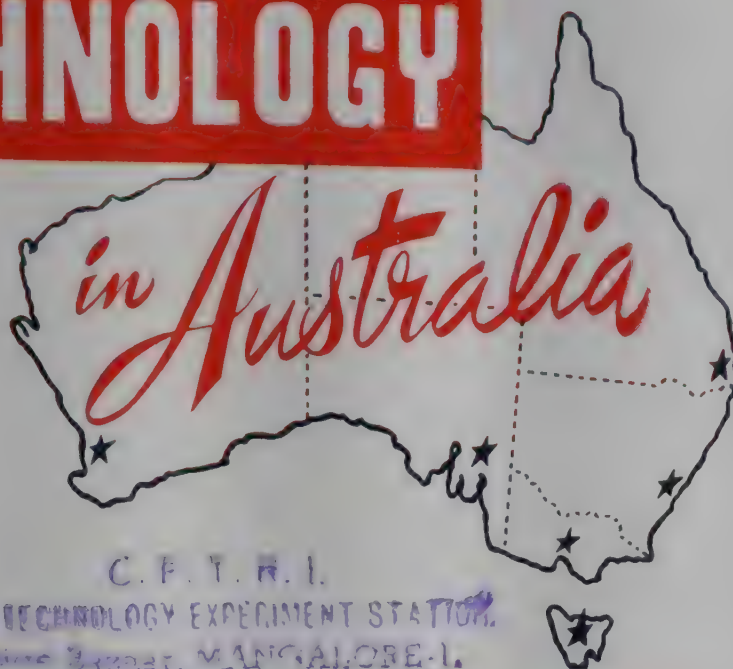
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FOOD TECHNOLOGY

VOL 17, No. 9

SEPTEMBER, 1965



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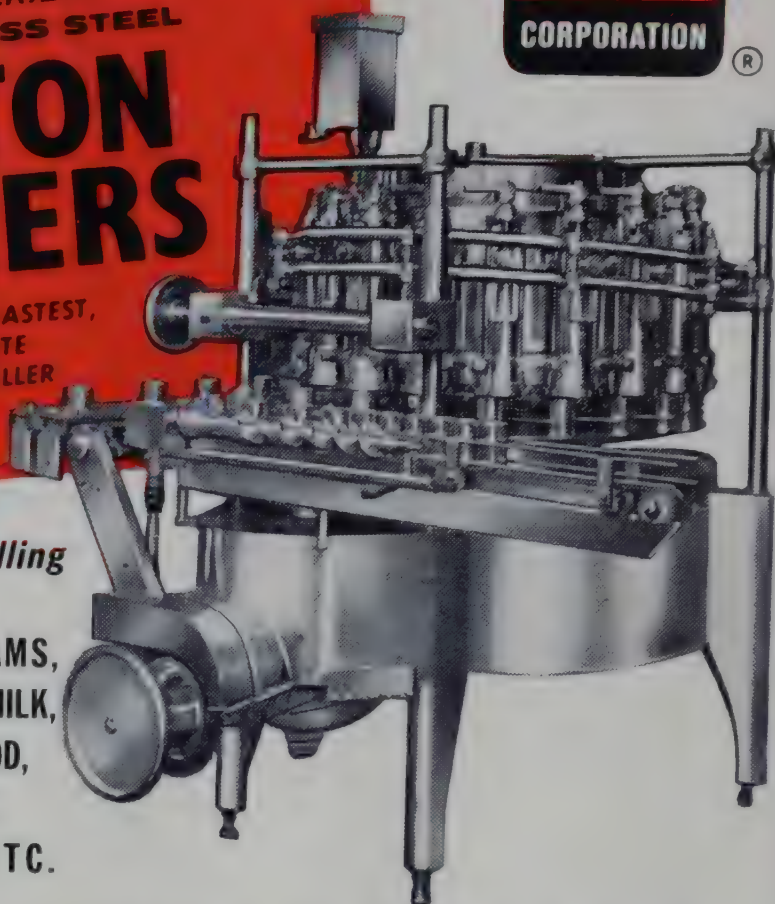
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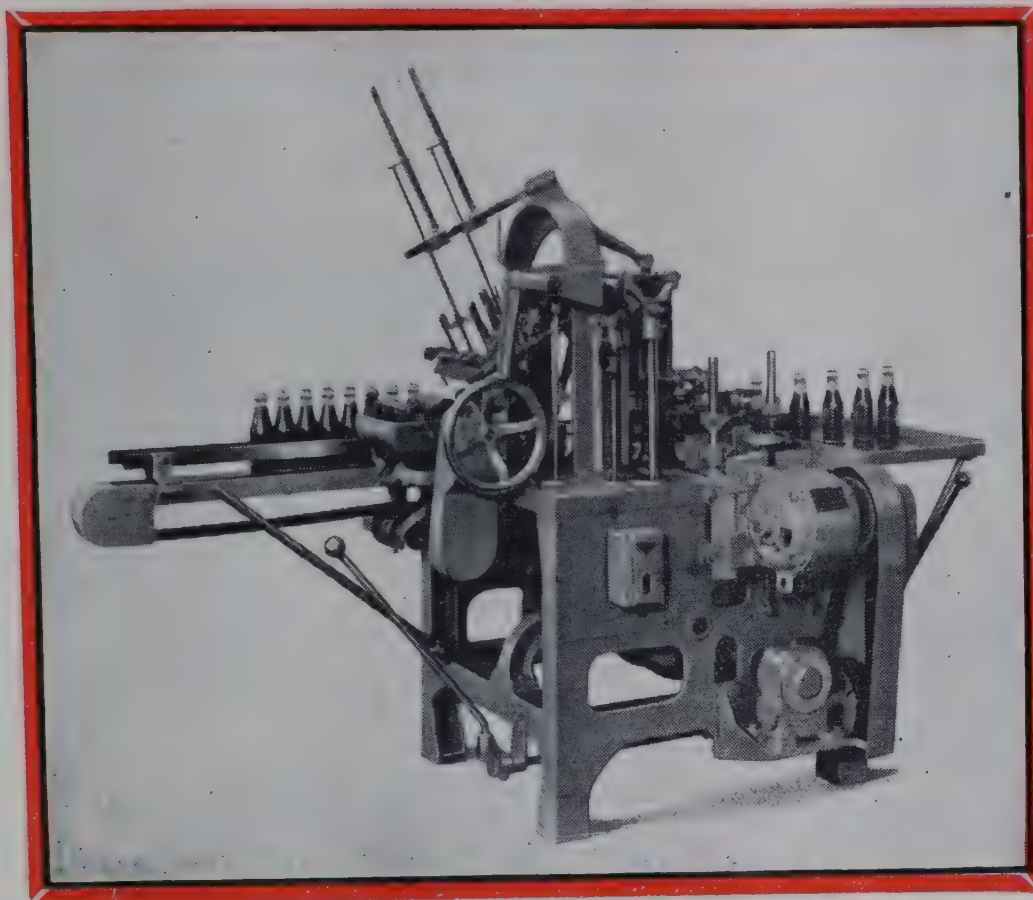
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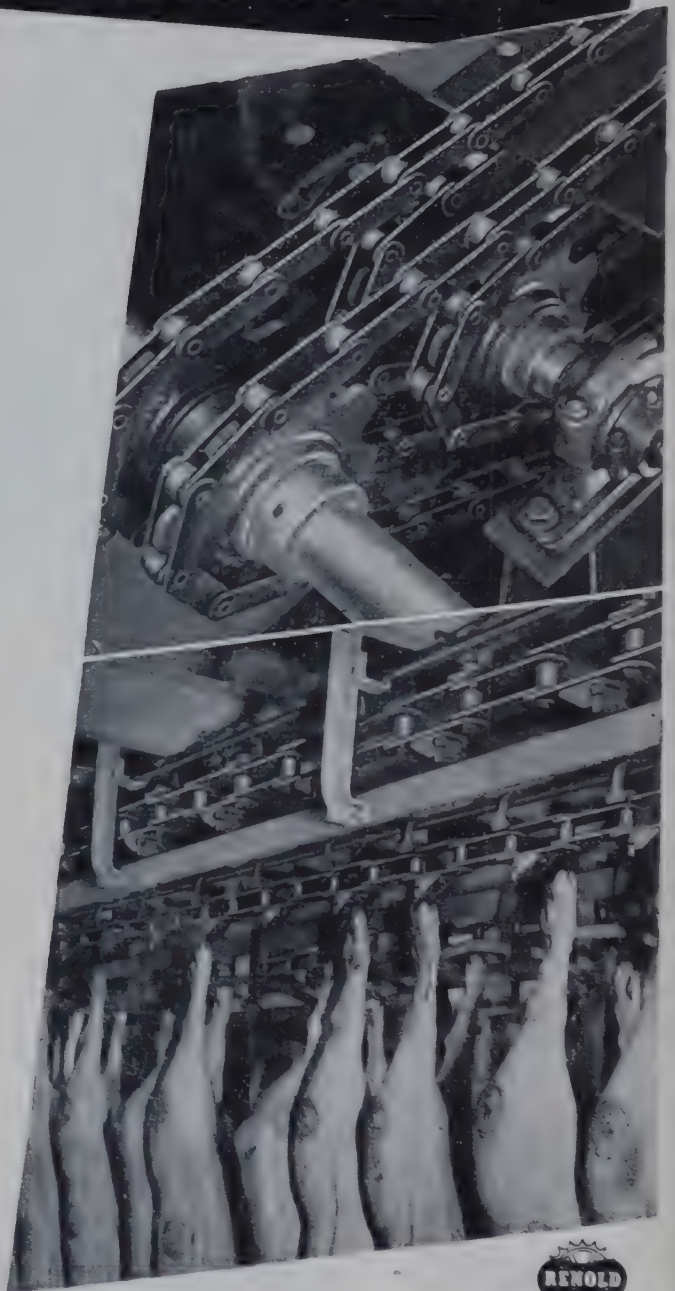
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Acting Editor:

R. A. EDWARDS, A.S.T.C., B.Sc., Ph.D.,
Senior Lecturer in Food Technology, The
University of New South Wales.

Business Manager:

S. M. ADAMS.

Office:

12 O'Connell Street, Sydney, N.S.W.
Telephone: 25 5401.

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Food Composition

As publicized in the July issue of this Journal, the Nutrition Section of the Commonwealth Department of Health is currently seeking the support of the food industry and others, in compiling more reliable figures for the *Tables of Composition of Australian Foods*. Already, we understand, some useful new information has been received, and it is to be hoped that manufacturers who have not already done so, will provide as detailed a comment as their records will allow.

Apart from efforts such as this, there appears to be no organized attempt to accumulate facts and figures on the composition of Australian foods, yet there is no doubt of the real need for such information. The need is most obvious in two unrelated areas, the first of which applies to a matter close to the heart of C.A.F.T.A.'s activities and ambitions — that of meaningful regulations. Too often, in the consideration of a particular draft regulation, reliance has to be placed on compositional studies that have been made overseas, and there is no clear indication that such results are meaningful in the establishment of Australian standards. That this is of particular importance as regards Australian fruits, was highlighted by the difficulties encountered in dealing with draft regulations for fruit juices.

The other area in which much more information is required is that of nutrition. The nutritionist and dietitian are faced with the problem

of providing dietary regimes that control the intake of specific food constituents, and again are hampered by the lack of published information on locally produced foods. Conditions such as galactosemia, phenylketonuria and those requiring sodium- and potassium-restricted diets are manageable only insofar as a strict dietary control can be achieved, and this implies sound compositional data of Australian foods.

Whose responsibility is it to accumulate such information? It is hardly within the province of the C.S.I.R.O. or the Universities, who are concerned more with basic research than with data collection. It is also possible that much of the required information is already available within the records of the food industry, and is simply waiting to be tapped by an organized effort. This was indicated by the response to the combined C.A.F.T.A., Australian Dietetic Council, Institute of Food Technologists approach of 1963, when industry was invited to make available what figures it had on the sodium and potassium content of its products.

With the C.A.F.T.A. machinery geared for the question and answer technique it should not be too difficult to collect compositional data on a regular and continuing basis. As such it would be a long term project, but one that will eventually have to be tackled on a national basis.

Use of Ventilated Vans for Transport of Fruit and Vegetables in the Tropics and Sub-Tropics

By J. D. MELLOR,

Division of Food Preservation, C.S.I.R.O., Ryde, N.S.W.

Production of fruit and vegetables in irrigation areas, climatically more favourable, has resulted in a phenomenal growth in haulage of out of season produce for long distances by rail and road. Whereas North America and Europe use controlled temperature (refrigerated) vehicles almost exclusively, Australia and South Africa rely extensively on ventilated, non-refrigerated vans. These vans are used in temperate and sub-tropical regions to transport a variety of perishable produce all the year, and more perishable produce over long distances in cooler weather. Compared with refrigerated vans, ventilated vans are cheaper to construct and cost far less to maintain and operate. Their main disadvantage is that produce temperatures are largely dependent on atmospheric temperatures whereas in refrigerated vehicles uniform low temperatures can be maintained independently of the weather. Ventilated vans are dependent on the outside air which circulate through the louvred sides and ends of the vehicle to carry away from stacks of produce the heat retained from the field and that generated by respiration. During movement of the vehicle this can result in the produce being cooled to the average diurnal temperature of the outside air, or even slightly lower if evaporative cooling occurs. The louvres are set at an angle to prevent rain entering and are sometimes screened against insects and cinders.

In Australia the principal types of ventilated railway vans vary in size from those of 40 ton capacity mounted on heavy bogies to small 11 ton four-wheeled vehicles. Many are constructed of wood but of late years, generally of metal. These vans are used throughout the year for transporting bananas, potatoes, and other tropical fruits, and during the winter for carrying beans, tomatoes and other produce from sub-tropical regions in the North to markets, mainly in the South. Under favourable conditions tomatoes are sent as far as 2,400 miles and have been safely sent 500 miles in the early summer with air temperatures averaging 80°F. The same vans are used to carry general produce on shorter journeys all the year from country cool stores to city markets and also fruit intended for export. They are used also for carrying citrus fruit under a wide range of climatic conditions.

In South Africa similar vans are used regularly in Cape Province to carry deciduous fruit on overnight journeys to shipping ports¹. The main winter crop of citrus and some deciduous fruit are sent greater distances in ventilated vans from

A Paper contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, Geneva, 1962.

The Conference Proceedings have been published as the "Report on the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas", in eight volumes, and are available for purchase.

the hinterlands of sub-tropical Transvaal and Rhodesia to the southern and western ports of the country. Fitted with racks, the South African vans are also used to transport grapes in baskets.

COOLING

Before being stacked in ventilated vans the produce should be cooled as much as possible. It is sound practice to harvest early in the morning and shelter the produce from the sun at all times. If cool room facilities, or equipment for producing cooling through evaporation or by hydrocooling techniques, are not available, the produce should be allowed to cool off in the shade, while still in the picking containers. Open stacks of produce in open and shallow containers can be cooled during the night to near minimum atmospheric temperature. Similarly, stacks of produce if placed in the shade where there is good air movement, will cool to near mean day temperature, and packaged produce open stacked under the same conditions will cool beneficially, fruit in cartons generally more slowly than in wooden cases. Inadequate cooling prior to loading is often the cause of high temperatures during transport and consequent spoilage of produce. Loading and transport during the night hours is preferred. During the day, loading should preferably be done under cover. In Australia and South Africa suitable shade sheds have been erected at major rail sidings to reduce heating of produce during day loading.

In continental areas in the tropics and sub-tropics there is usually a substantial fall from a high day to a low temperature of the air during the night. For example, at Alice Springs in Central Australia, near the Tropic of Capricorn, the mean maximum is 81.3°F and the mean minimum 53°F during the autumn and spring months. In such areas it is obviously advantageous to make full use of the cooler night air to

cool the produce both before and during transport. Likewise, if the produce is suitably stowed and left to cool during the night it can be transported during the day without a substantial rise in temperature taking place. Air temperatures at night remain high in coastal regions, nevertheless, a certain amount of cooling can be achieved as shown in Figure I. The tempera-

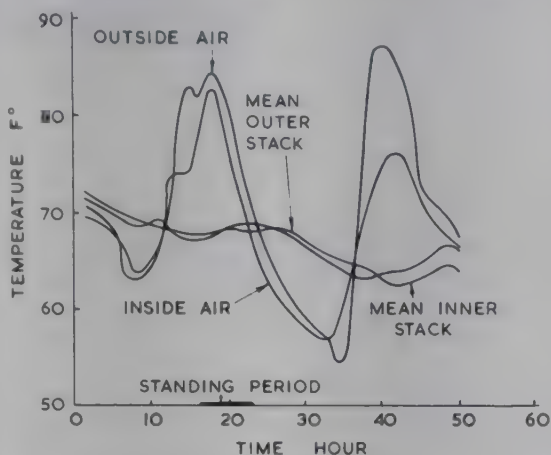


FIG. I — Temperature histories — rail transport of a block stow of bananas in cases.

ture of a block stow of bananas in cases fell 9°F during a two-day journey along the North Coast, New South Wales, in summer with a mean minimum air temperature of 65.6°F. In this test cargo, temperatures fell whilst the train was kept moving, but rose about 1°F after the train had stopped for 6 hours. Australian studies on the effects of train speeds and periods of standing on cargo temperatures emphasize the importance of express rail transport for fruit. It was also found that in the larger louvred vans there was more circulation of air through trailing-end stacks than in leading-end stacks when the train was moving quickly.

All fruit and vegetables produce heat to a varying degree by respiration and also tend to cool by evaporation.

The rate of heating by respiration varies greatly with temperature, increasing steeply in the range of 40 to 100°F, and also varies with the kind of fruit and vegetable. Some



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typical rates at 60°F are: pears 4°F/day, bananas 2.5°F/day, potatoes about 1°F/day, cabbages 6°F/day and carrots 3°F/day. Beans, peas and lettuce may warm up by as much as 15°F/day at 60°F.

The degree of evaporative cooling depends on the characteristic rate of evaporation (wetness)² of the produce and the dryness of the air. It may be an important contributing factor to cooling in transport. Successful transport in summer of green bananas, which have 23 per cent wetness (based on the evaporation of a similar but entirely wet surface), depends appreciably upon evaporative cooling. Although green vegetables evaporate rapidly, objectionable wilting soon occurs and excessive evaporation often must be guarded against during long journeys.

In a cool room at 32-34°F an initial cooling rate of 1°F/hr can readily be obtained with loose fruit in wooden cases, but individually wrapped fruit will cool more slowly. However, cooling rates of a bed of fruit or vegetables in pallet-base bins (approx. 4 ft x 4 ft by 20 in. deep) may be as high as 4°F/hr if the floor of the bin is suitably vented, and the whole bin freely exposed³. Even without refrigerated cool rooms the use of bins for storage of fruit in the packing sheds and for transport is worthy of consideration if there is mechanical equipment available for their handling.

A wide range of equipment for evaporative cooling is now available, but many of these units are expensive and require electrical power.

In warm dry weather evaporative cooling may be simply employed by wetting the produce or the containers and freely exposing them to a current of air. Under good conditions it is possible to cool the produce to a temperature approaching wet bulb⁴. No more than a single row of packages should be placed downstream since the air will pick

up a considerable amount of moisture during its movement.

Vacuum cooling by pumping out a large vacuum chamber filled with produce has been used commercially in the U.S.A. and elsewhere for the rapid cooling of lettuce. It can only be used for cooling produce with a very high surface to volume ratio. Cooling may often be assisted by spraying the produce with water before loading into the chamber. The principle can be used with relatively simple equipment when less complete cooling is sufficient.

Hydrocooling by flood spraying or by immersing the produce in cool water is the quickest method of precooling. The heat transfer coefficient for cooling in water is about 50-100 times that for air cooling (2-3 Btu/ft²hr°F). Last summer in Australia bananas in hands, at a temperature of 81°F, were cooled to about 55°F in water at 50°F in about 20 minutes, and then very successfully carried in a solid stow in a louvred van during a two day journey.

VENTILATION

Adequate movement of air through a rail van can be obtained by louvring its sides, including the doors, and end walls. Such louvres provide an open surface of up to 50 sq ft per 100 sq ft of louvred wall area where the slats are set at an angle not less than 45° to the vertical. When metal louvres are used they are frequently curved downwards on the outside for better protection against the weather. Depending on the method of stacking, the main air stream in large vans is likely to be in through top louvres, downwards, and out through the bottom louvres, but in small vans it is likely to be mainly in at the front and out at the back.

Many classes of vegetables are normally bagged and in transport the bags tend to settle into solid stacks, under their burden weight, thus greatly restricting further the



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air movement. Since the rate of heating by respiration is very high in vegetables such as peas and beans, it is essential to provide air channels through the stacks of bags. A better method is to freely expose the produce in crates, or open weave baskets.

Air channels may be created with narrow width mesh frames⁴ placed vertically across the van after each single or double row of bags, or other containers. Such frames should also be used in cargoes transported by road.

Slatted crates designed to provide built in air gaps, for example, with octagonal ends, can be used for a wide variety of vegetables and fruit. They are much more satisfactory than bags or non-rigid baskets as mechanical damage is also minimized.

In recent years the increased use of fibreboard cartons for carrying fruit has created many new problems such as protection in wet weather, the burden weight of stacks and, particularly, bad ventilation caused by the almost complete absence of air gaps in close stows.

When wooden boxes with bulged tops and bottoms, for example, standard apple boxes, are stacked on their sides, the bulges provide vertical channels which usually ensure sufficient air gaps in the stows. Some bulging is important; however it should not be excessive otherwise the fruit under the lid is severely bruised during packing. Sometimes wooden boxes are made with cleats which obviate the necessity for bulges and at the same time provide shallow air spaces. In stacking cartons, the successive overlapping of open rows is recommended, as shown in Figure II to assist in binding the stack together so minimizing derangement in transit.

Stacks of cartons may be adequately vented with mesh separators between every second row of cartons. Bananas shipped as hands

in cartons cooled by 4-5°F when such separators were used compared with only 1-2°F in chimney stows, and almost as well as in bulged wooden boxes. Little advantage normally appears to be gained by venting the cartons. Slots in

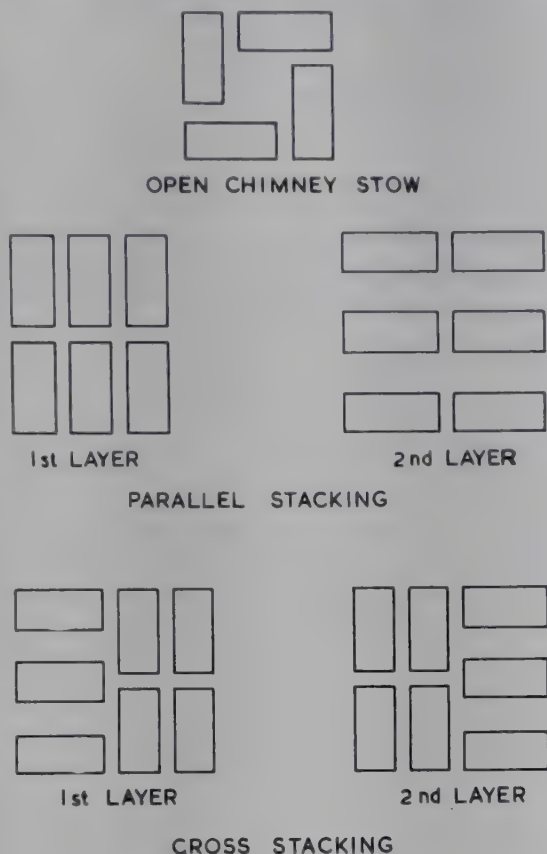


FIG. II — Stacking arrangements for carton packages.

their sides and ends tend to be covered by the displacement of the stack in transit no matter how carefully they may be staggered beforehand.

Fairly reliable information from temperature measurements on the cooling efficacy of different methods of stacking can be obtained by sampling fruit in the middle of a large number of containers in the stack at loading, and during unloading, using stab thermometers which have been calibrated to read to one or two-tenths of a Centigrade degree.

LOUVRED VANS

Design and Construction. Today most of the larger louvred vans in Australia are made of steel but

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earlier models (see Figure III) constructed of wood are still used successfully for perishable produce. These vans, fitted with heavy duty automatic couplings and air brakes for high speed running and smooth



FIG. III — A wooden bogie louvered van of 24 ton capacity.

operation, are mounted on well sprung bogies. This equipment is important as derangement of stacked produce is a common fault in vehicles not so well equipped. The larger vans of 20-40 ton capacity are usually divided by a central transverse lattice partition. They are fitted with louvered double doors which may be hinged or of the sliding type. The latter are not generally recommended. The South African vans, in addition to three-quarter length double doors, have a small solid door hinged to the edge of the floor so that it can be let down on to the platform to make a ramp for trolleys. In South Africa the inner sides of the louvers are protected with fine mesh perforated metal so as to exclude larger insects and cinders. Although insects do not commonly present a problem in Australia, protection against other forms of injury is sometimes desirable. Some fruits, particularly bananas, suffer from cold injury in winter and tarpaulins have been hung on the inside walls of the vans to restrict air movement. The floors of the vans should be level, and the lowest louver openings should be close to the floor level and, to make full use of an outward suction effect at floor level, should not curl downwards on the outside. In

Western Australia venting the floor of louvered vans by spacing the floor boards has greatly increased internal air circulation.

To minimize solar heating through the roof most modern vans are fitted with a radiation shield about 3-4 in. above the main roof. Where such a shield is used it should be painted a glossy light colour. Alternatively the roof may be insulated.

Loading Systems. Although at present manual stacking is generally used it is conceivable that in the future greater use will be made of bulk handling techniques for rail vans as is already the case with road vehicles. The drop-down ramp from the South African vans is known to be used in conjunction with trolleys which are taken in for unloading via the ramp. The use of fork-lift equipment could be considered. Roller conveyors, invariably used in conjunction with manual stacking, can be brought up to the loading area without interfering with the stackers. To facilitate loading and unloading it is desirable, with most stacking systems, for long containers to be loaded transversely across the van away from the doors and parallel to the sides. The containers should not be stacked up closer than one foot from the roof to provide an air plenum above the stack.

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Flattery is telling the other man precisely what he thinks about himself.

— Dale Carnegie



Milk Powders and Other Milk Proteins Available for Use in Foods

By R. A. BUCHANAN,
Division of Dairy Research, C.S.I.R.O.,
Highett, Vic.

I feel safe in assuming that most of you are familiar with the general properties, composition and keeping quality of milk powders, but we have found that in practice most consumers are not familiar with the ways in which these general properties can or will be modified by changes in composition, in manufacturing techniques or during storage.

COMPOSITION

The most obvious way to vary the composition of milk powder is to include all, a portion or as little as possible of the milk fat.

In practice the composition of whole- and skim-milk powders are approximately as follows:

	Whole milk Powder (per cent)	Skim milk Powder (per cent)
Fat	27	1
Protein ...	26	36
Lactose ..	37	52
Minerals .	7	8
Water ...	3	3

Yet minor variations in the percentages of each of these components may be very important for certain consumers. For instance, ice cream manufacturers prefer a low lactose content to obviate a tendency towards *sandiness* in their products. Many other food manufacturers prefer a high protein content to raise the nutritive value of their product. They should be aware that the composition of skim milk powder produced in this country can vary considerably between dis-

tricts and at different times of the year. Skim milk powder from Victoria's Western District is usually 38-39 per cent protein, but can vary from approximately 37 to 40.5 per cent. Queensland and N.S.W. powders are generally a little lower than this but Victorian areas outside the Milk Board collection areas will generally be a little higher.

TYPE OF DRIER:

Both roller and spray dried powders are available in Australia. The physical and chemical properties of each are very different.

PARTICLE SIZE AND SHAPE:

The average size of the particles of roller dried powder depends on the degree to which the sheet of dry material is broken up in passing from the roller to, and through, the sieve. There will thus be considerable variation about the mean value which, for comparison with spray dried powder, may be taken as about 0.01 in. or 250μ ($1\mu = 0.0001\text{ cm} = 0.00004\text{ in.}$).

In spray drying the size of the particles is influenced by the type of atomization used, the concentration of milk and other factors in the operation of the drier. They vary from $10\text{-}200\mu$ but most will be found to be in the range of $30\text{-}75\mu$.

The particle of roller dried powder is a solid, flat, irregular plate-

An address to the 15th Convention of the Institute of Food Technologists Australian Regional Sections, Adelaide, South Australia, 1965.

let, whereas the spray dried particle is a sphere containing cavities filled with air.

FLOW PROPERTIES:

Where powder is handled in bulk it is important that it should flow readily. In general, roller dried powder, because of its larger particle size, flows more easily than spray dried powder and skimmed powder more easily than whole milk powder. There can be considerable variations between different spray powders, apparently the result of differences in the range of particle size, a powder of more uniform particle size flowing more readily.

To improve the flow properties of a milk powder, sodium aluminium silicate and/or calcium phosphate may be added. Up to 1 per cent will give a very significant increase in flowability and incidentally a significant reduction in volume.

BULK DENSITY OF FULL CREAM MILK POWDER AND MILK POWDER BLOCKS

Uncompressed milk powders vary greatly in the volume they occupy per unit weight. Spray dried powders are usually denser than roller powders, because the small spheres of spray powder pack together with less inclusion of air than do the small irregular plates of roller powder. Uncompressed spray dried powders vary appreciably in bulk density according to the type of plant and degree of pre-condensation of the milk, but the usual range is from about 0.5-0.6 g/ml. Treatment of spray dried powder to give the so-called *instant* powders results in a lower bulk density of 0.3-0.4 g/ml. The density of uncompressed roller dried powder is generally lower than that of spray powder and varies between about 0.3 and 0.5 g/ml. The bulk density of roller powders is considerably influenced by the amount of breaking-up the dried material undergoes from the rollers to the final con-

tainer. The density of the roller dried skimmed product can be increased by milling but this is not advisable with full cream powders.

Under a pressure of several tons per square inch full cream milk powders of both types can be compressed to densities ranging up to 1.1-1.2 g/ml without appreciable loss of fat, the lighter blocks being easily crumbled in the hand, but the denser ones requiring grinding in a mill before reconstitution.

SOLUBILITY AND DISPERSIBILITY IN WATER

In fresh liquid milk only the lactose and mineral salt are in true solution. The proteins are in a colloidal state and the fat is dispersed in microscopic droplets, most of which range in size initially from 2-5 μ . The solubility of milk powders when reconstituted in water depends mainly on the degree to which the heat-sensitive proteins have been affected by the drying process. Since full cream milk powder contains about 26 per cent and skimmed powder about 36 per cent protein, the solubility of the powder would fall to 74 per cent or 64 per cent respectively, if the whole of the protein were denatured.

In practice it is found that the higher temperatures to which roller dried powders are exposed frequently cause the solubility to fall to about 80 per cent whereas spray dried powders usually remains 95-99 per cent soluble. Milk powders usually have a slightly higher solubility in warm water than in cold, and the roller dried product, in particular, reconstitutes more satisfactorily in warm water.

If milk powder is placed on the surface of unstirred water it will, in greater or less degree, spread and become wetted before solution begins. The ease with which water can make contact with the particles, known as the *wettability* of the powder, is governed by such factors as the size of the particles, the density of the powder and the

presence of free fat. Wettability is more important when reconstitution is to be on a small rather than on a large scale, but powder with good wettability will generally produce a smoother mix than one of poor wettability, assuming the solubility of both to be the same. Although roller dried powders are more wettable than spray dried, they are, as already mentioned, less soluble. Skimmed milk powders are usually more wettable than whole milk powders.

BROWNING REACTION:

The browning reaction in milk powders is important for several reasons and there are a number of factors which will influence the extent to which it takes place.

The degree of the reaction is important to bread manufacturers because it helps brown the crust in bread and slices of toast, yet pastrycooks prefer not to have a burnt crust on their cakes. Lactose-protein interactions are probably the major reason for flavour defects which shorten the storage life of skim milk powder and at the same time such interactions reduce the nutritive value of milk solids by binding lysine and making this important amino acid biologically unavailable.

For most consumers at least one of the above properties will offer an important reason for choosing a powder in which this reaction has been properly controlled. It certainly highlights the folly of even a small-town baker using the same milk powder in both his bread and his cakes.

In practice a high-heat powder is produced by heating the milk to high temperatures (up to 240°F) and/or holding for extended times (up to 30 minutes) before concentrating and drying. A low-heat powder can be produced from milk which has had no more than normal pasteurization treatment, *i.e.* 162°F for 15 seconds. Of course the fresh high-heat powder will have

undergone considerable browning reaction and the low-heat powder virtually none. But considerable further reaction can take place during storage.

All milk powder is hygroscopic and must be protected from atmospheric moisture if this type of deterioration is to be prevented. Any marked increase in the moisture content above the level at which the powder leaves the factory (34 per cent) is likely to lead to an accelerated development of objectionable *stale* or *gluey* flavours on storage. At relatively high moisture contents a progressive loss of solubility in water also takes place, the solubility in cold water of spray powders being affected rather more rapidly than their solubility in hot water. In extreme cases, when powders of high moisture content are subjected to high storage temperatures, they can develop a brown discolouration and suffer a marked loss in the biological value of the protein.

VISCOSITY

The factors affecting the viscosity of recombined milk products in general and milk powders in particular are not well understood. They are however being investigated by a group at the C.S.I.R.O. Division of Dairy Research interested in problems associated with the manufacture, in Asian countries and elsewhere, of recombined sweetened condensed milk and recombined evaporated milk. In general low-heat powders can be recombined to give a lower viscosity than high-heat powder. Conversely, maximum water absorption in prepared mixes, etc., will be achieved with a high heat powder. We have found, too, a very close relationship between rate of age thickening and initial viscosity of recombined sweetened condensed milk.

HEAT-COAGULATION

With recombined evaporated milk the central problem is to avoid heat-



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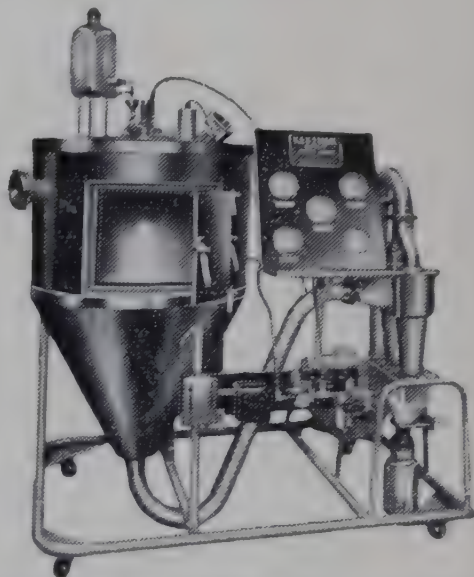
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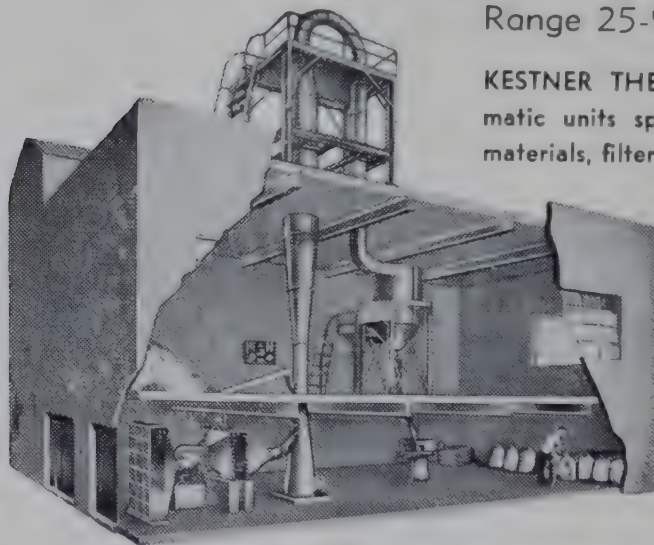
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coagulation during sterilization. This is achieved in general by using a high or medium-high heat powder. But the factory processing conditions needed to give the most heat-stable powders have been found to vary seasonally and between districts.

WHEY PROTEIN NITROGEN INDEX

The W.P.N. index is a measure of the undenatured whey proteins in a milk powder and is thus a guide to the amount of heat treatment the milk has received before drying. A low-heat powder should have a W.P.N. of at least 6.5 and a very high-heat powder such as is used in breadmaking, less than 1.5.

For most purposes, food manufacturers would do well to study the suitability of powders with varying W.P.N. indexes so that they can stipulate their requirements more precisely when ordering milk powder. But let me issue a warning. The W.P.N. index is only a guide to the suitability of a given powder for a given purpose. For instance, ultra-high temperature (over 212°F) preheating of milk combined with a brief holding time may give the same W.P.N. as another plant using lower preheating temperatures and a longer holding time, but the performance of the powder may be quite different. It is well known that milk powder for use in bread must be held for nearly 20 minutes before evaporating, even if the preheating temperature is raised to 240°F. but 20 minutes at 185°F may be adequate.

MODIFIED SKIM MILK POWDERS

1. *Bakers powder*

The special skim powder, with glycerol monostearate and potassium bromate added, for bakers, developed by the C.S.I.R.O., is well known to the dairy industry and to bakers. In preparing this product the skim milk is heated to 185°F for 30 minutes before concentrat-

ing then the bromate and GMS emulsion added after concentrating. This powder can be used in bread containing no other source of fat — most bread contains about 2 per cent fat. But many bakers prefer to buy skim milk powder without additives then add the other ingredients separately. In these cases they need high-heat powder prepared from skim milk which has again been heated to 185°F for 30 minutes before concentrating.

2. *Meringue powder*

Fluffex and *Albumix* are modified skim milk powders which will replace egg albumin in meringues or pie glazing with considerable savings in costs.

3. *Sponge powder* is a whole-egg substitute powder which was developed some time ago for use in flour confections but is not in commercial production at present.

4. *Instant milk powders* are now readily available and finding a growing market in a wide range of commercial uses as well as in its own right in the retail trade. The procedures by which these powders are made will favour protein-sugar interaction and therefore require very careful control if adverse effects on flavour and keeping properties are to be avoided. This powder should be used within 6 months and it is even more important than with ordinary milk powder to prevent any marked rise in moisture content or temperature during storage.

5. *Vitamin-fortified powders*

Skim milk powders can now be fortified with the fat soluble vitamins and in fact U.N.I.C.E.F. have distributed several million pounds of such fortified products in under-developed countries.

6. *Malted milk powder* can be manufactured simply by adding malt to the skim concentrate before drying.

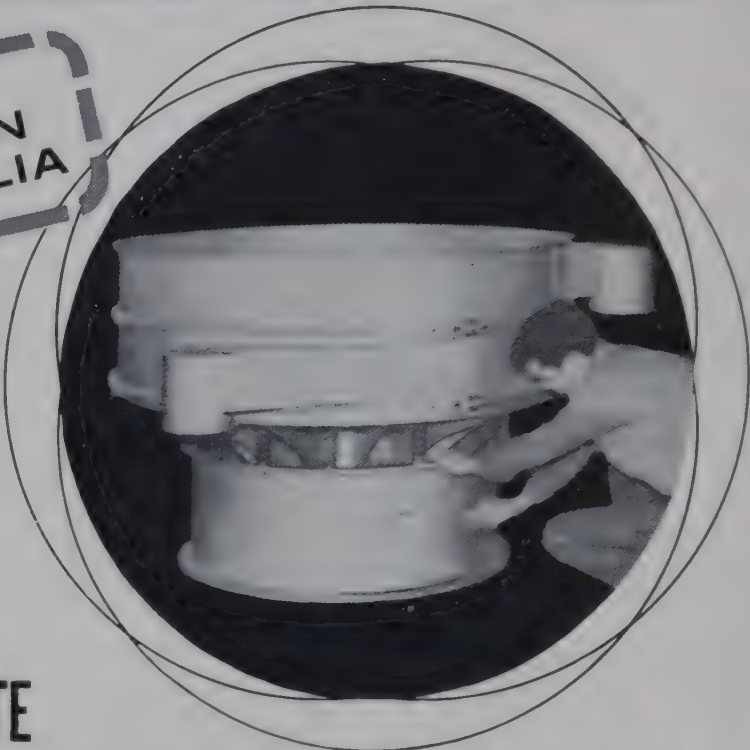
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powder has a slightly higher fat content than skim milk powder and includes most of the phospholipid (lecithin) from the milk fat-globule membrane.

The extra fat gives this product a slight advantage over skim milk powder in nutritive value but makes it more susceptible to rancid and oily off-flavours. It must therefore be kept in a cool dry place and not be exposed to direct sunlight or strong odours.

A Victorian dairy company has recently commenced the manufacture of a special buttermilk powder using the serum from the manufacture of butteroil. This should be even higher in phospholipids than regular buttermilk powder and may have advantages as an emulsifier.

CASEINS

Lactic, hydrochloric and sulphuric caseins are available in edible grades. They contain approximately 85 per cent protein and are produced as a hard dry curd, usually ground to a 30-90 mesh.

Sodium caseinate is a water soluble, spray dried powder and contains approximately 87 per cent protein. It is used in meat products, cake mixes and special diet foods. In the U.S.A. it is used extensively in coffee creaming powders and breakfast cereals.

Locally a modified form is dried with added salt for ready incorporation in meat packs. Another is dried with added sugar to improve solubility, particularly in cake mixes. A sodium caseinate with a more oven-stable foam may be available shortly.

A calcium caseinate is also being produced here now, mainly for use in special dietary foods.

Hydrolyzed casein is used extensively as a substitute for soy sauce and as a flavour enhancer in meat products.

CO-PRECIPITATE

We have recently succeeded in manufacturing, on a commercial

scale, a new 80 per cent protein co-precipitate which brings together 97 per cent of the proteins in milk. It can be produced in a plant similar to that used for commercial casein but the yield per gallon of milk is much better than in commercial casein manufacture where only about 80 per cent of the protein in the milk is recovered.

It is available in a granular form or the curd may be dissolved in sodium tripolyphosphate and spray dried.

Preliminary trials have shown that the granular form is suitable for use in meat products and the spray dried powder is suitable as a substitute for skim milk powder in bread. We hope that it will also prove useful as a protein supplement in ice cream and a wide range of special foods.

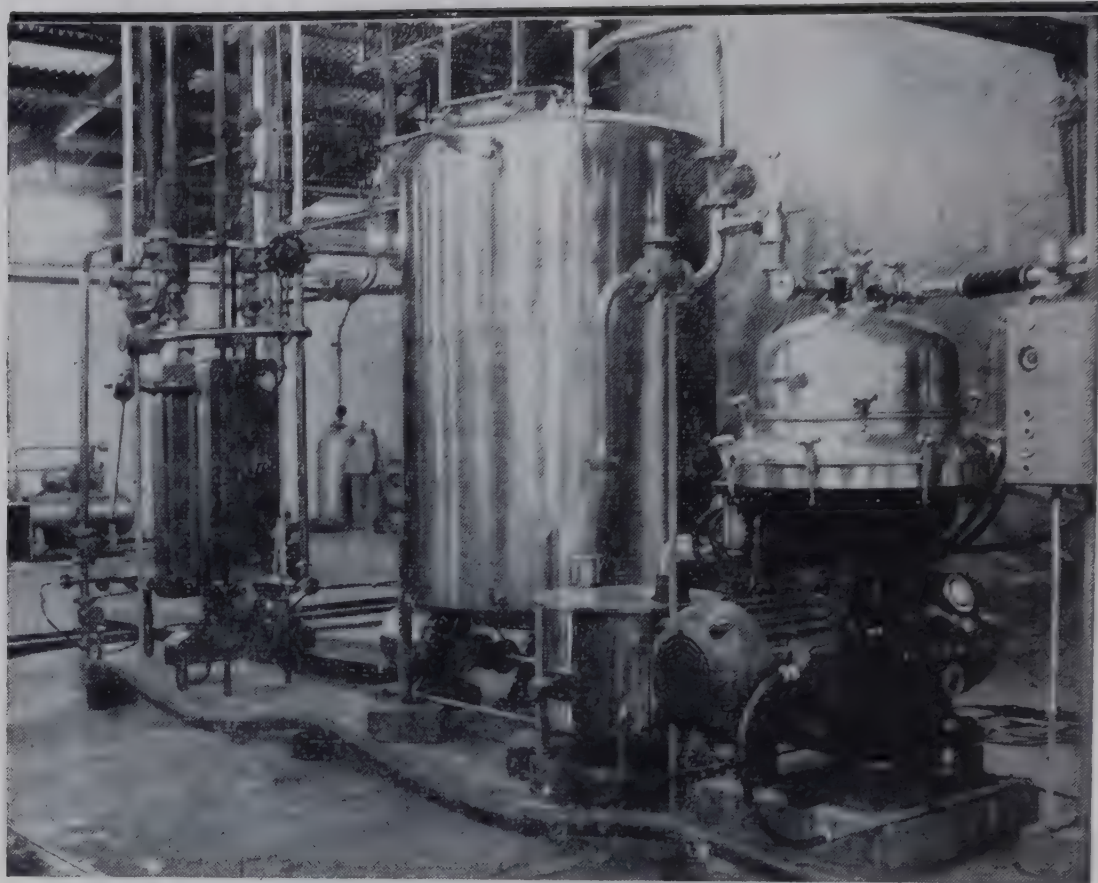
With the present ruling high prices for milk protein we are hopeful that with this new product we will be able to offer an even cheaper source of milk protein than in the traditional products previously available.

LATIN-AMERICAN COMMON MARKET?

Formation of a Latin-American common market has been recommended to the governments of the western hemisphere by four leading Latin-American economists. Their report was presented to the ambassadors of all countries of the hemisphere, including Mexico, Canada, Cuba and the United States. The plan is expected to be discussed at the 11th meeting of the Economic Commission for Latin-America in Mexico City.

"An academic career puts a young man into a kind of embarrassing position by requiring him to produce scientific publications in impressive quantity — a seduction into superficiality which only strong characters are able to withstand."

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KAMARADIN

— Dried Apricot Pulp

By M. GRNCAREVIC,
C.S.I.R.O., Horticultural Research Section,
Merbein, Victoria

Kamaradin is an Arabic name for apricot pulp dried in the form of thin sheets. In English books⁽²⁾ the term *leather* has been applied to this favourite dried fruit product of the Middle East. It is consumed mainly in drinks or sauces, and is an important item of diet for the local population during the Ramadan fast period. During the First World War it was part of the Turkish Army's field ration.

The largest producer and exporter of kamaradin is the Syrian Arab Republic where apricots hold the third place in the horticultural production of the country. On an area of 20,000 acres an average of 23,000 tons of fresh apricots are produced annually. The apricot production is mainly located around Damascus where 10,000 acres are under irrigation⁽¹⁾. For comparison, in Australia the total acreage under apricots is 11,847 acres with a production of about 50,000 tons of fresh apricots⁽³⁾.

It is estimated that in Syria 50 per cent of the apricot crop is used for the production of kamaradin, 40 per cent for fresh fruit and 10 per cent for other purposes. On the average 3,000 tons of kamaradin are produced annually, some of which is exported at a price of U.S. \$500 per ton to neighbouring Arab states and to Canada and the U.S.A.

In Syria most kamaradin is still produced on a small scale in the orchards. Processing is mainly done by hand without mechanical aids, but factory type processing, using

pulping machines, is slowly taking over, with big advantages in quality and economy. Kamaradin is mainly made from a local variety called *Klaby*. Fruit of this variety is rather fibrous and too small for marketing as fresh fruit, but has a pleasant flavour.

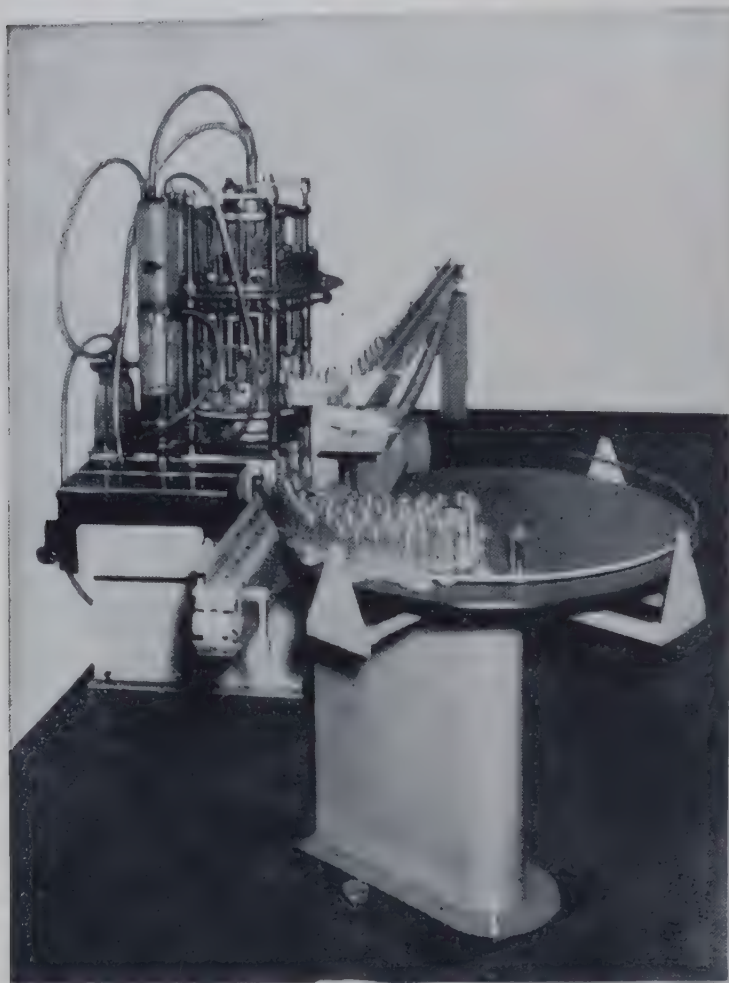
The production of kamaradin is essentially a simple process. Washing of the apricots is necessary because many are windfalls; after washing, the whole apricots are exposed for varying times (one hour or more) to sulphur dioxide fumes in sulphur boxes. Sulphuring softens the fruit and facilitates pulping, but uncontrollable variations in sulphur dioxide levels are obtained by this method.

Experiments have indicated (Grncarevic, unpublished data) that further sulphuring of the pulp with potassium metabisulphite is advantageous. Because between one-half and two-thirds of the initial sulphur dioxide is lost during the drying operation, an addition of sulphur dioxide in the form of potassium metabisulphite will secure a minimum level of 500 ppm necessary for the preservation of a golden-yellow colour in the final product.

After pulping of the sulphured fruits, mechanically or by hand, and screening, the stones and fibre are removed. The paste is collected in a suitable basin, and 5 per cent sucrose and 5 per cent glucose syrup (hydrolyzed starch) are added. The addition of sugars improves the quality considerably. The pulp is

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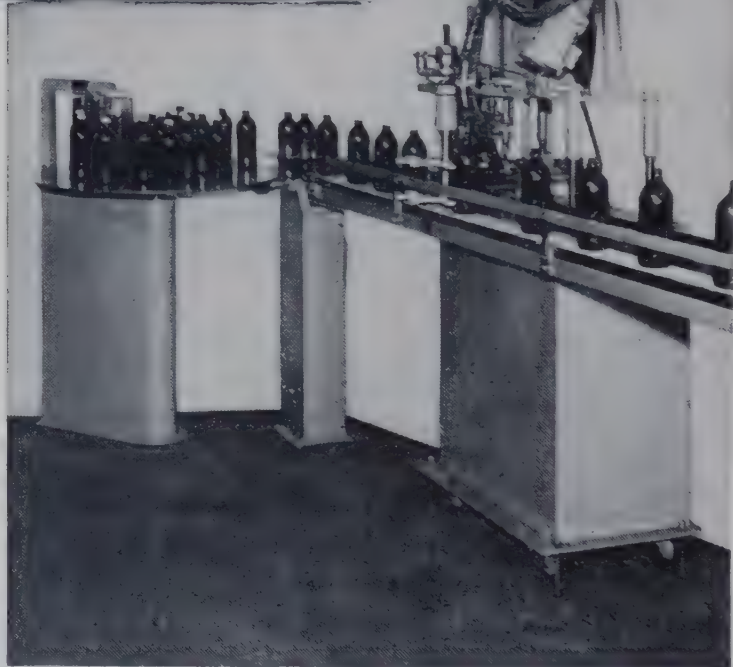
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then spread on wooden trays on boards (6 ft x 1 ft x 2 in.) at a thickness of 8-20 mm, the boards having been thoroughly oiled with olive oil to prevent sticking. The boards are then placed in the sun on the bare ground or on small racks.

Drying lasts about 3-5 days, giving a dried product in thin sheets of leathery consistency. The final moisture is about 20-22 per cent. During the drying the pulp can easily be contaminated by insects and dust, and therefore the drying grounds are usually surrounded by poplars; in factories sealed yards are used, protected by brick walls. The dried kamaradin sheets are stripped from the board by hand and folded for convenient handling. They are usually wrapped in yellow cellulose film or parchment paper and stored at room temperature.

The ideal product is of a golden-yellow colour and highly nutritious (7,000 I.U. of vitamin A per 100 g), pliable texture, and very pleasant to eat as it is; it reconstitutes easily and gives drinks or sauces of good apricot flavour. The quality of Syrian kamaradin is variable, especially from the village producers, who find it difficult to control insect infestation. Improvements are being made with the help of F.A.O. experts.

Kamaradin is a convenient and simple way of processing apricots unsuitable for other purposes. It is a stable product, and offers great scope for improvement and development commercially and technologically. It can also be produced by mechanical dehydration and recent experiments in Syria have given a high quality product.

Australian apricot varieties Trevatt and Moopark have yielded good quality kamaradin (Grncarevic, unpublished data) indicating that this form of processing could be used with advantage in Australia, especially for over-ripe fruits, slabs or partly damaged apricots. Other Australian fruits could probably be

preserved in a similar way, especially mango and other tropical fruits which are already dried in this manner in India.

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- (2) Commercial Fruit and Vegetable Products by W. V. Cruess, McGraw Hill Book Co., New York, N.Y. 1958.
- (3) Year Book of the Commonwealth of Australia, No. 50, 1964.

CO-OPERATIVE ANALYTICAL TESTING: CRUDE FIBRE AND FLOUR ASH

CEREAL CHEMISTRY GROUP,
THE ROYAL AUSTRALIAN CHEMICAL
INSTITUTE

At the 1964 Cereal Chemistry Group Conference the check sample analyses showed that there were large (between laboratory) variations in the *Crude Fibre and Flour Ash* results. Accordingly, the Analytical Sub-Committee was instructed to find the sources of these variations.

These tests are subject to many variables, and in order that it can determine their extent, the Committee is conducting a survey of the laboratories in the Cereal Group performing these tests. It is expected that the results from this survey will assist the sub-committee in planning future work, and when they come from laboratories participating in the check sample service, will, in conjunction with the check sample results, give a measure of the effect of some of the variables.

In previous years this committee has had the assistance of many laboratories in the surveys which it has conducted. This year it is hoped that laboratories which perform either of these test will be able to assist the project by completing forms sent out by the Convener.

Let each one mind his own affairs and he will have his hands full.

— Cervantes

The Nutritionist in Industry

Some provocative views on the role of the nutritionist in industry were expressed by

Dr. A. E. Bender at a symposium on Changing Food Habits held recently at Queen Elizabeth College, London.

The food manufacturer is fully aware that people buy foods because they like them and not because of their nutritive value. This fact, together with his own lack of knowledge of nutrition, encourages the manufacturer to ignore nutritional value in favour of sales appeal. The manufacturer makes what the public wants.

The greater part of all our food — said to be 98 per cent of the total calorie intake — passes through the hands of the food processing industry. Of itself this industry creates almost nothing: its function is to transform the often inedible and usually short-lived products of the farmer and the fisherman into palatable and attractive forms, in recent times into more convenient forms, and, most important, into forms that will keep for long periods. Hence a great responsibility for the health of the consumer rests on the shoulders of the food processor; yet a rough calculation suggests that there is only one acknowledged nutritionist to seventeen food firms.

INADEQUATE USE OF FOOD CHEMISTS

Possibly of more serious import than the relative lack of nutritionists in industry is the lack or misuse of food chemists. Most food chemists have some interest in nutrition and can be relied on to take steps in the right direction, or at least to appreciate advice when it is offered, but what of food processing that is carried on without the aid of food scientists?

The food industry is often called traditional, which means that much of it has been carried on for generations by the same methods as were used before vitamins, minerals, proteins and even calories were known. The attitude of some manufacturers is that they have never needed chemists in the past and therefore do not need them now. If they are forced to employ chemists for analytical control of the raw materials and the products, such manufacturers often fail to make use of the chemists in production and do not seek their scientific advice.

AMERICAN LEAD NOT ALWAYS FOLLOWED

Sales promoters often look to America for a lead, and, if the outlook is attractive, confidently foretell that we shall alter our habits in the same direction and to the same extent as the Americans. This occasionally happens but usually it does not. In the case of potato crisps where a few years ago we ate one tenth of the American *per capita* intake we now eat half, with every hope (by the manufacturers) of catching up, but we have already seen signs that the much-expected increase in the consumption of broiler chickens may not materialize for the simple but un-American reason that people are objecting to the lack of taste.

NUTRITION AND THE ADVERTISING WORLD

Despite our British lower gullibility (or is it greater maturity or

possibly innate conservatism?) sensational dietary information always gains a hearing at the expense of orthodoxy. Who wants to hear of ordinary everyday foods that are rich in vitamins, minerals or proteins when he can listen to tales of cider-vinegar and honey diets, bees' royal jelly or *biochemic salt*? A sensational book on any of these subjects will be serialized in the popular press or discussed on television. A lecturer extolling the virtues of what are so wrongly called *natural* foods will be eagerly sought after by the public while one who merely discusses food and orthodox nutrition is reserved for technical audiences.

Despite the public appetite for sensational information rather than orthodox nutrition, it has become fashionable today in the food advertising world to draw attention to the nutritional merits of food-stuffs. The public are informed of the proteins, vitamins, minerals and even the glucose, that are present.

This procedure has a real effect on the nutritional state of the population because if the manufacturers vie with one another, even if for purely commercial reasons, in making their products of higher nutritive value by adding supplements or by choosing better raw materials then the result is that the diet of the community is of higher nutritive value and the chances of finding poorly nourished individuals amongst the population must fall.

It would be interesting to discover the reasons why manufacturers or their advertising agents make nutritional claims. An outstanding example in this field is glucose for energy. The claim fell on fertile ground, as so many people so often feel worn out, depressed, lethargic, and — as they would express it themselves — lacking in energy.

The merits of glucose slowly dawned on other food manufacturers so that they either, with the aid of their chemists, discovered glucose in their products, or added it.

The ultimate absurdity was the firm of sweet manufacturers who pasted a label across the jar reading — "*contains glucose enriched with dextrose*". Glucose is an alternative name for dextrose.

The weight of advertising of nutritional properties appears to be having some effect upon the habits of the consumer. To alter food habits, even in a small degree, calls for two things at the same time. First there must be some basic reason for its acceptance; for example, instant, prepackaged and convenience foods fitted well with the post-war habits of working housewives, breakfast cereals fitted with the trend to reduce the time spent in preparing meals, and glucose sounded most acceptable to those of us who were not feeling energetic. Secondly, it requires the combined selling might of the whole section of the industry in a prolonged campaign to instruct, inform and persuade the consumer.

HOW NUTRITIONAL STATUS CAN BE IMPROVED

There are many examples of new foods requiring a generation to live down a bad reputation, whether deserved or not. Thus canned foods had to fight the undeserved prejudice against a *tinny* flavour and a belief in the inferiority of canned food; margarine had to live down memories of early war-time poor quality. A government-sponsored food that does one good starts off with a handicap and a food introduced in war-time has the brand image of being a substitute for something better. How long will it take before the public in this country voluntarily accepts soya in food products?

There are three ways of improving the nutritional status of the population without trying to alter its eating habits. One method is fortification of even more of our staple foods by Government decree. A second is by manufacturers using improved methods of food process-

ing so that foods reach the consumer with higher nutritive value. The third is to achieve the same end by fortifying foods with the nutrients that are already available in synthetic form such as certain amino acids, mineral salts and vitamins. However, if we knew why people choose what they do, we might be in a better position to influence that choice.



INSTITUTE OF FOOD TECHNOLOGISTS

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TENTATIVE CLASSIFICATION OF FOOD IRRADIATION PROCESSES WITH MICROBIOLOGICAL OBJECTIVES

H. E. Gorsline (Food and Agricultural Organization, Rome, Italy), M. Ingram (Low Temperature Research Station, U.K. Agricultural Research Council, Cambridge, England), P. Macuch (Institute of Hygiene, Bratislava, Czechoslovakia), G. Macquot (Centre National de Recherche Zoologique, Jouey-en-Josas (S.-et-O.), France), D. A. A. Mossel (Central Institute for Nutrition and Food Research, Utrecht, Netherlands), C. F. Niven, Jnr. (California Packing Corp., San Francisco, Calif.) and F. S. Thatcher (Canada Food and Drug Directorate, Ottawa, Canada) as members of an expert group, have been asked to define the main types of irradiation processes applied to foods for microbiological purposes and to suggest names for them. They suggest the following as the result of their best effort and are interested in further suggestions:—

Sterilization by irradiation would be the application of doses which produce total sterility. This state cannot be guaranteed by any present process.

Radappertization would be the application of doses which reduce the number and/or activity of viable organisms (except viruses at present) below levels detectable by any recognized method while no spoilage occurs no matter how long or under what conditions storage takes place.

Radacidation would be the application of doses which reduce the number of non-spore-forming pathogenic micro-organisms (other than viruses) to levels below detectability by any standard method.

Radurization would be the application of doses sufficient to enhance keeping quality by reducing substantially the numbers of viable specific spoilage organisms.

"Nature", 204 (4955), 238, 1964.

SOURCE OF LAMB FLAVOURS

Lamb meat gets its characteristic flavour from the fat, probably from minor constituents called carbonyls, a U.S. Department of Agriculture study shows.

Continuing research to isolate and identify these flavour components may point the way to methods of enhancing or modifying the taste of lamb to increase its acceptance by many consumers. This study of lamb flavour — conducted by chemists of U.S.D.A's Agricultural Research Service — confirms previous A.R.S. work with beef and pork.

The earlier research indicated that fat contained the compounds responsible for the characteristic flavours of different meats. The lean contributes a flavour that is apparently common to all meats. (Any consumer cut of meat normally contains some fat.)

Dr. Irwin Hornstein and Patrick F. Crow, working at the Beltsville meat laboratory of the Eastern Utilization Research and Development Division, are tracing meat flavours to their source.

Since the full flavour of meat develops only through cooking, the chemists must identify both the chemical constituents of the aroma produced by heat and the precursors of these constituents in the raw meat.

In the lamb study — as in the earlier work with beef and pork — the scientists extracted with water the flavour-producing substances from the raw lean, then freeze-dried the extract to a powder and heated it.

The aroma produced by the lamb extract was due to essentially the same chemicals as the aromas from the lean beef and pork extracts.

Cooked patties made from ground lamb with all the fat removed had only the general taste of meat — not the characteristic lamb flavour.

The chemists then trapped the aromas produced by heating rendered lamb fat and obtained a substance with a strong mutton odour.

When the substance was treated with a chemical (2,4-dinitrophenylhydrazine) to remove the carbonyls, the mutton aroma was reduced. This indicated that carbonyls were at least partially responsible for the flavour.

To determine the precursors of flavour developed by cooking, the researchers used the same chemical to treat raw lamb fat dissolved in hexane.

This treatment divided the fat into two fractions. The large fraction, containing about 97 per cent of the fat, was free of carbonyl and produced no mutton aroma when heated.

The small fraction, made up of the remaining 3 per cent, contained all the carbonyls converted to another form by the chemical treatment.

The A.R.S. chemists have not yet been able to identify individual carbonyls that would account for the flavour. They believe, however, that among the carbonyls not yet identified they will find the compounds responsible for lamb's characteristic taste.

BACTERIAL SPOILAGE OF PROCESSED MEATS

Bacterial control in the processing of meat products in order to prevent contamination of the food with organisms pathogenic to man and to production of material toxic to the consumers.

L. E. Brownlee, "C.S.I.R.O., Food Pres. Quart.", 24, 30, 1964.

LIQUID NITROGEN

Freezing by liquid nitrogen is opening the way to freezing of a number of food items which previously had met with only limited success when frozen by conventional methods in the United States.

The recent introduction of whole mushrooms in flexible film *pour-and-store* bags by The Borden Co., frozen by liquid nitrogen, heralds the advent of a wide range of new frozen food items.

Slated for future commercial production are such items as avocados, asparagus tips, whole kernel corn, cherries, sliced peaches, sliced pears, strawberries, raspberries, fish fillets, meats and precooked foods, breaded mushrooms and onion rings.

While some of these items are already available to the American caterers, plans for a series of consumer market tests are currently being implemented.

The individually quick frozen mushrooms are frozen with a liquid nitrogen freezing process. The technique utilizes the -320°F temperature of liquid nitrogen, through either immersion or spray freezing, to provide an extremely rapid freezing cycle, minimizing the size of the ice crystals which form within the cells of the product being frozen, thereby helping to preserve the natural texture, flavour and colour of the product.

DISTRIBUTORS TRY LIQUID NITROGEN REFRIGERATION

Liquid nitrogen refrigeration systems are being tried by several major frozen food distributors in the United States, as a solution to multiple-stop problems.

The recent conversion of their fleet of trucks to liquid nitrogen refrigeration systems by two major

frozen food distributors on the East Coast underscores the trend toward liquid nitrogen for multiple-stop, or L.T.L., delivery of frozen foods and emphasizes the increased awareness on the part of the shippers of the need for proper handling of frozen foods during delivery.

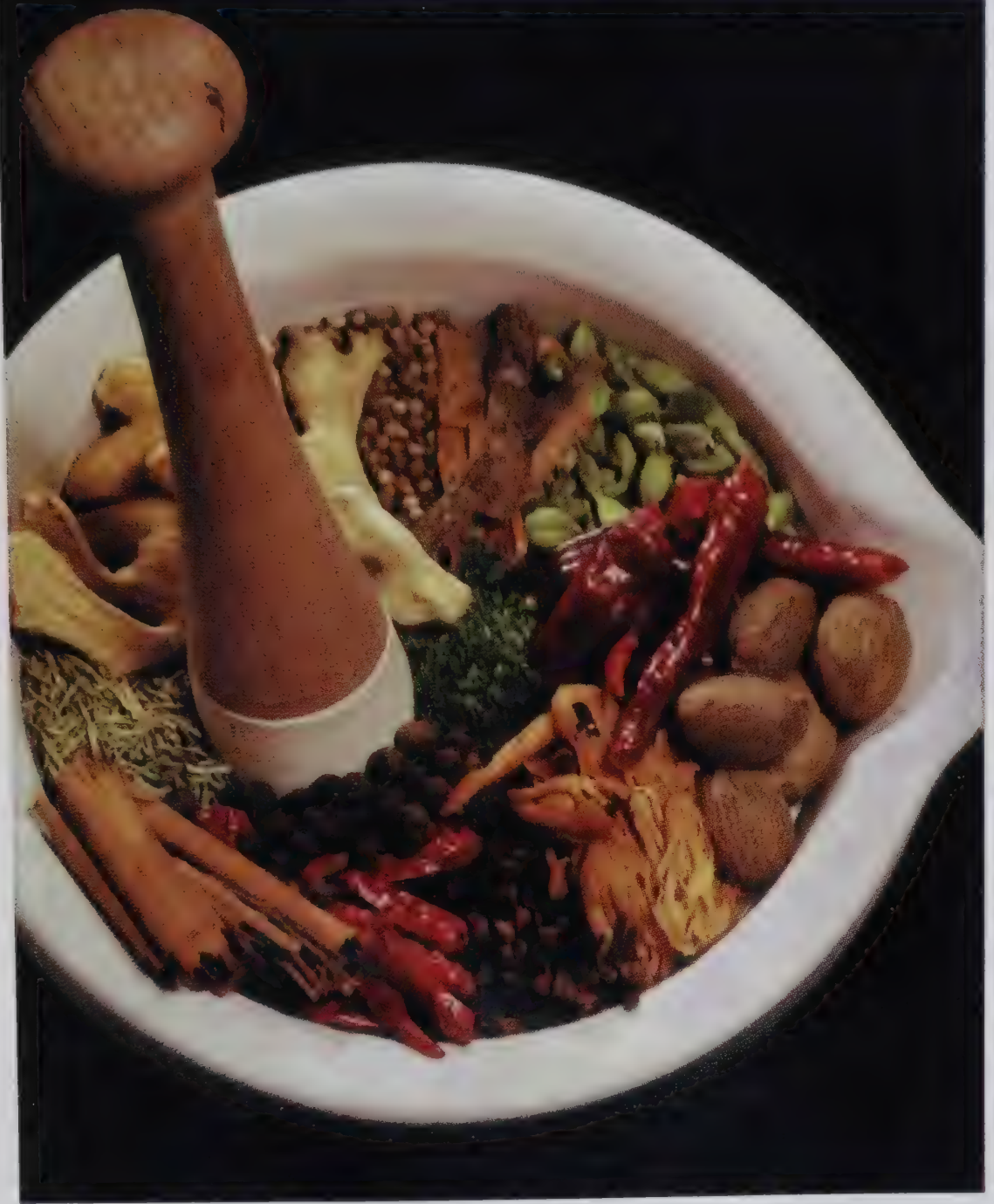
A Mid-Western firm, the largest distributor of frozen seafood in that region, has adopted liquid nitrogen refrigeration.

The long-standing problem of maintaining proper temperature levels during multiple-stop, short-haul delivery of frozen foods is one which continues to haunt the frozen food industry, and the realization of this problem has been heightened by the adoption of the A.F.D.O.U.S. Code and the formulation of various state and local frozen food handling codes which stress the requirement for zero temperatures in the transportation of frozen foods.

In attempting to find a system which could maintain a constant zero temperature without being adversely affected by the constant opening and closing of doors, during delivery, and one which was capable of quickly reaching and maintaining a zero temperature for short hauls, these distributors, along with a number of others, have turned to liquid nitrogen. This system can also be combined with electrical systems for stand-by holding in the yard.

REFRIGERATORS IN U.K.

About 36 per cent of all British homes are now equipped with a refrigerator, compared with 98 per cent in the U.S., according to a survey prepared by Birds Eye Foods, Ltd. Half the homes in London have refrigerators, compared with less than 20 per cent in other parts of the country.



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BOOKS, PAMPHLETS, etc.

"NON-RETURNABLE FISH BOXES"

By J. Wignall. D.S.I.R. Torry Advisory Note No. 16, 1964. 5 pages.

This advisory note has been prepared as an answer to some of the questions that are asked by (U.K.) users and manufacturers of non-returnable fish boxes.

"PROTEIN REQUIREMENTS"

Report of a Joint F.A.O./W.H.O. Expert Group. World Health Organization: Technical Report Series, No. 301, 71 pages. Price, 6/8.

Although immense strides have been taken forward in the production of food, a large part of the world's population is undernourished. The greatest nutritional problem in the world, according to this report of a Joint F.A.O./W.H.O. Expert Group, is protein nutrition in young children, and protein malnutrition, if both its direct and indirect effects are considered, is a major cause of ill health.

This report attempts to define the protein requirements and amino acid pattern and requirements of children and adults as accurately as possible, in the light of the considerable amount of new knowledge that has accumulated on the subject. The approach mainly used in the estimation of protein requirements is the factorial method, which estimates separately all the components of the requirement at each age and physiological state — the need to replace the losses occurring obligatorily through the urine, faeces, and skin and the small loss through menstruation, the need for the formation of new tissue in growing children, the need to provide for the mother and the foetus during pregnancy and the baby during lactation, etc. Apart from the physiological, other factors influ-

ence protein requirements and utilization, such as climate and illness and, in another field, the presence or absence of essential vitamins and minerals. After a full discussion of the whole complex subject, the Expert Group suggests appropriate practical allowances to meet the various contingencies likely to arise in a normal human life, and concludes with a series of recommendations on further research

Available through Hunter Publications, 23 McKillop Street, Melbourne, C.1.

"ROAD TRANSPORT OF FROZEN FISH"

By D. L. Nicol. D.S.I.R. Torry Advisory Note No. 8, 1963. 5 pages.

This note briefly discusses the need for low temperature transport, container design, loading and unloading, and recommendations for the maintenance of suitable temperatures.

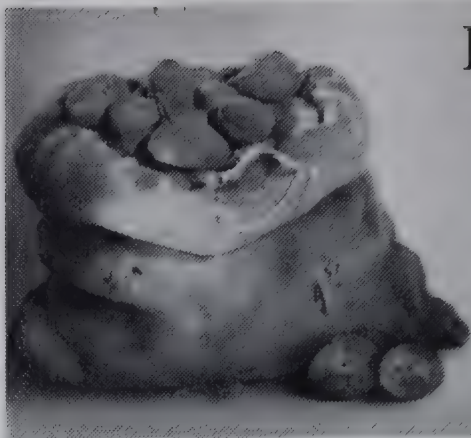
"BETTER HANDLING OF FLORIDA'S FRESH CITRUS FRUIT"

Bulletin 681, University of Florida Agricultural Experiment Stations, Gainesville, Fla. September, 1964. 38 pages.

"RECENT ADVANCES IN THE PHARMACOLOGY OF TOXINS"

Edited by H. W. Raudonat, 240 pages. Pergamon Press, Oxford. 1965. 70/-.

The papers contained in this volume review recent research results, and indicate the present trend of investigation in this field. After studying the general aspects of toxic pharmacology, the papers deal with Venoms, Bacterial Toxins, Tetanus Toxins, Streptolysin O, and Staphylotoxins.



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**"SOME CONSIDERATIONS IN
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IN SAFETY EVALUATION OF
PESTICIDES AND FOOD
CHEMICALS"**

Publication 1270: National Academy of Sciences — National Research Council, Washington, D.C. 1965. 22 pages. \$1.50.

A report of the *Ad Hoc* Committee on Use of Human Subjects in Safety Evaluation of the (U.S.) Food Protection Committee, N.A.S.-N.R.C.

The *Ad Hoc* Committee's terms of reference were "*to define needs, principles, and justified procedures for use of human subjects in safety evaluation of food chemicals and pesticide residues*". This publication comprises the report of that Committee.

●
**"SULPHUR DIOXIDE
PRESERVATION OF FRUITS"**

B. F. E. Atkinson and C. C. Strachan. Publication 1176. Canada Department of Agriculture, Ottawa, 1964.

●
**"VACUUM PRECOOLING: A
COMPARISON OF THE COOLING
OF DIFFERENT VEGETABLES"**

12 pages. U.S. Department of Agriculture, Agricultural Marketing Service, Market Quality Research Division. (Marketing Research Report No. 600). Washington, D.C. 1963.

Final temperatures obtained during 25 or 30 min. vacuum cycles with minimum pressures of 4.0 to 4.6 mm Hg. ranged from 34° to 65°F. Moisture loss was high for lettuce and green onions, but low for potatoes and squash, resulting in little cooling for the latter group. Packaging materials retarded cooling by impeding the movement of moisture, but reduced the rate of warmup after the vacuum was broken. Adequate ventilation of cartons or film wrappers was necessary to obtain desirable vacuum pre-cooling of vegetables packed in shipping containers.

**"LOWRY-COCROFT ABSTRACTS
FOR THE FOOD PROCESSING
INDUSTRIES"**

These Food Processing Abstracts, published by the Lowry-Cocroft Organization in the U.S.A., search approximately 150 journals, U.S. patents in food technology and pertinent technical papers. The abstracts are prepared on 5- by 8-inch edge-punched cards and are classified under three main subdivisions: Type of Processing; Type of Food Handled; Kind of Information.

Abstracts are sent out weekly, and are delivered outside the United States by air mail without extra charge. Subscription price is £108 per year or £54 for six months. Further details may be obtained from the sole agents in Australia, B.C.N. Agencies, 62 Wellington Parade, East Melbourne, C.2, Vic.

●
**"VACUUM COOLERS:
PRINCIPLES AND DESIGN
CRITERIA"**

By J. K. Wang and H. M. Gitlin, Co-operative Extension Service, University of Hawaii. Bulletin 69. 1964. 36 pages.

This bulletin is concerned with principles of vacuum cooling and design considerations for vacuum cooling plants in the State of Hawaii.

●
**"PROCEEDINGS OF THE
CONFERENCE ON ADVANCES IN
FLAVOUR RESEARCH"**

New Orleans, Louisiana, March 25-26, 1963. U.S. Department of Agriculture, Agricultural Research Service. 1964.

●
**"PROBLEMS ASSOCIATED WITH
PURCHASE AND USE OF FROZEN
FOODS"**

By F. E. Hunt, Research Circ. 126, Agricultural Experiment Station, Ohio. U.S. Department of Agriculture. 1963.

STAINLESS STEEL CONTAINERS



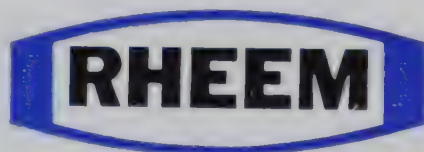
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BOOK REVIEWS

- "DESSERT APPETIZER AND RELATED FLAVOURED WINES", by M. A. JOSLYN and M. A. AMERINE, *Agricultural Publications, University of California, Berkeley 4, California*, 483 + XII pages, 1964. \$7.50.

Although dessert wines are of very great importance in English speaking countries and a few other regions, they represent a very small fraction of the world's total wine production and consequently receive little attention in most text books on oenology. This book is one of the few which are confined to fortified wines and makers of such wines have reason to be grateful to the authors.

The book can be considered as a companion volume to "*Table Wines*" published by the same authors in 1951, and it maintains the high standard set in the earlier publication. It is divided into eighteen chapters and opens with a description of the various types of appetizer and dessert wines and the U.S. and California regulations controlling their production and marketing. Economic aspects of the industry are discussed and then follow chapters which cover all aspects of the making and handling of the various wines under discussion as well as the design, equipment and operation of the winery. The chemistry of wines and the factors influencing wine quality are discussed and there are very useful chapters on the evaluation of wines both by chemical analyses and organoleptically.

As stated in the preface, the objective has been to emphasize basic principles of wine making and in this the authors have succeeded admirably. They have also drawn attention to important gaps in our knowledge of the chemistry of some

phases of the subject and the need for further research. In addition, current techniques are discussed including such modern innovations as ion exchange treatments and the use of compressed yeasts.

The book is attractively produced and well illustrated with relevant photographs pertaining to the California industry. A few typographical errors were noticed, but most of these are too obvious to be misleading.

Although intended primarily for the winemakers of California, the book will also be of considerable interest and value to those concerned with the production of dessert and appetizer wines in other countries.

Reviewer: J. C. M. Fornachon,
The Australian Wine Research Institute, Adelaide.

- "FATTY ACIDS — THEIR CHEMISTRY, PROPERTIES, PRODUCTION AND USES", by KLARE S. MARKLEY (Ed.). 2nd Edition, Part 3 — 993 pages. *Interscience Publishers Inc., New York*, 1964. £17.10.0.

The book under review is the third in a series which will comprise four volumes on completion. The first two volumes of the series were reviewed in the February, 1963, edition of "*Food Technology in Australia*" and it is pertinent to reiterate briefly the salient comments, made then, on the series as a whole.

The first edition of Markley's treatise was a single volume work published in 1947. Due to the enormous advances that have occurred in the subject in the following years it has been found necessary to expand the presentation to a four volume series to provide adequate and



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authoritative coverage of the subject. Perusal of the three volumes published to date indicates that these two aims will be admirably met. The authority of each subject treated is ensured by the fact that Markley has enlisted the aid of a number of co-authors to contribute chapters on subjects related to their special field of work.

In the present volume, six subjects are treated. Two of these are biochemical in nature, viz. Chapter XV — Biological Oxidation of Fatty Acids and Chapter XIX — Biogenesis of Fatty Acids. Chapters XVI and XVII deal respectively with nitrogen and sulphur derivatives. Markley contributes an important section on the "*Chemical Synthesis of Fatty Acids*" (Chapter XVIII) and the final chapter (XX) deals with "*Techniques of Separation*". This is the largest part of the book and is in turn divided into five sub-sections which discuss distillation, salt solubility, low temperature crystallization, liquid and gas-liquid chromatography, countercurrent distribution and urea complexes.

All the subject matter of this volume is well presented and thoroughly covered.

The final five pages of Part 3 list errata to Parts 1 and 2. Some of these are small, some of importance and, whilst the number may appear to be large, it is inevitable that errors of this nature will occur in so comprehensive a treatise. It seems more constructive to comment that it is highly commendable that considerable trouble has been taken to discover them and to rectify the situation.

One adverse comment must be made and this is the time taken to publish a series of this nature. Part 1 was produced in 1960, Part 3 in 1964 and there is no indication of the likely delay before Part 4 makes its appearance. It is to be hoped that it will be available in the near future so that it can take its place with the currently available volumes.

This outstanding work is quite obviously of immense value to all who have dealings with lipid materials. It will undoubtedly prove no less valuable to all organic chemists as a general reference on fatty acids.

Reviewer: J. D. Craske, Unilever Australia Pty. Ltd., Sydney.

- "*THE CHEMISTRY OF WHEAT STARCH AND GLUTEN AND THEIR CONVERSION PRODUCTS*", by J. W. KNIGHT, 156 pages, Leonard Hill, London, 1965.

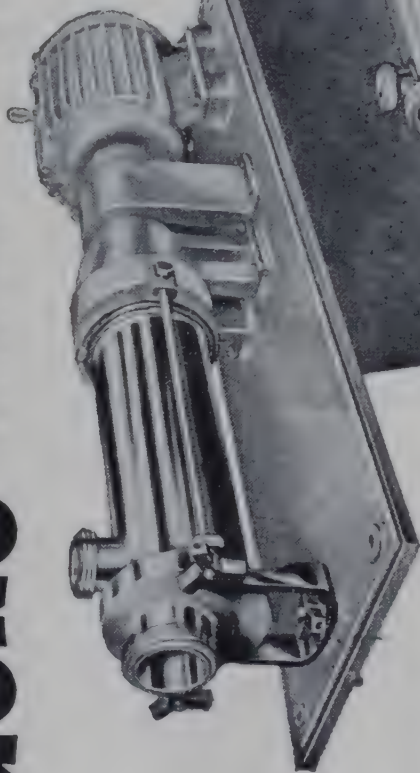
Although many books have been written on the subject of starch, this is the first book to deal exclusively with wheat starch and gluten, and because of this, it is a valuable reference book for all associated with the industry. The information is compiled mainly from experience in one starch factory in Australia, and the most detailed information relates to this experience. However, examples are given of other methods and equipment, so that the book does cover all types of equipment and processes.

The subject is covered in four chapters. The first relates to the methods of extraction, the equipment used, and the problems associated with the quality of the flour and the extraction process. The second chapter describes the various forms of starch and degradation products, including dextrins and sugars that can be made. It also describes the methods of making these, and the uses to which they can be put. This chapter is followed by a parallel chapter on gluten. The final chapter gives some of the laboratory methods that are used in the industry for evaluating the quality of the flour to be extracted and the quality of the finished products.

Much literature has been published about starch, but most is on maize starch and is of American origin, since maize is a much larger crop than wheat in the U.S.A.

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Most of the chemistry of maize starch applies also to some degree to wheat starch, so that the chapter on starch and its forms is mainly a brief review of the industry as it stands in America. However, the other three chapters are unique in that the information contained cannot be readily found elsewhere, and much of it has been derived from experience on the practical side.

Some of the terms used may be foreign to anyone not familiar with the industry. However, the book is logically presented and liberally illustrated with pictures and diagrams and would be a valuable addition to the library of workers in the field as well as to those in the many industries which use some form of starch or gluten in their process.

Reviewer: A. J. Meers, N. B. Love Industries Pty. Ltd., Sydney.



- "MICRO-ANALYTICAL ENTOMOLOGY FOR FOOD SANITATION CONTROL", by O'DEAN L. KURTZ and KENTON L. HARRIS. HELEN L. REYNOLD (Consulting Editor). 576 pages. Association of Official Agricultural Chemists, Inc., Washington, D.C. 1962. \$15.00.

This remarkable compendium of information on food contaminating insects will be an invaluable aid to workers in the field of food sanitation control and quarantine examination of seeds and similar material, and should become an essential working tool for all who are concerned with contamination of food products by insect fragments.

The authors, by reason of their close association with the work of the Food and Drug Administration Branch of the U.S. Department of Health, Education and Welfare, are particularly fitted to compile this unique work. For those with little previous entomological training, there are well presented sections dealing with the classification and

morphology of the principal orders of insects. Morphology is emphasized throughout the book; as the authors rather neatly express it "*the morphology of the principal orders is their insect fragment picture*". The good descriptions and illustrations given here should provide great assistance in the accurate identification of insects and other arthropods not usually associated with foodstuffs.

The greater part of the book is devoted to descriptions of stored product insects, their life cycles, and their fragments which may be encountered in food products. Other sections deal with insects involved because of their association with agricultural crops or with sanitation problems, such as flies, cockroaches, moth larvae and miscellaneous insects.

The outstanding feature of this book is the number and quality of the illustrations, which are generally excellent. Most of these are micro-photographs of insect fragments and explanatory diagrams are used freely throughout. The glossy paper used in the book has made possible the extremely good reproduction of these plates. The illustrations of larval and adult stages of some insects do not on the whole compare in quality with the micro-photographs and some of these could have been larger and better defined (e.g. *Rhyzopertha dominica*, page 251).

Keys to adult and immature stages of insects have been included where necessary and these are made easily understandable by the accompanying diagrams of the characters to be sought. A key to adult Lepidoptera is not given, but good illustrations of rubbed wings of representative types are included. Identification in this group is largely based on keys for larvae and pupae. The information in some sections, for example that dealing with Bruchidae under Miscellaneous Insect Contaminance, is incomplete and a key to genera and



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species would have been very useful.

The authors' emphasis on etiology of contamination is directed always towards ensuring better sanitation in food processing. Conscientious use of this manual by workers in this field must have the effect of continuing improvement in food purity. In the preparation of evidence in legal action involving food contamination, this reference will be an invaluable aid.

Reviewer: P. C. Hely, Chief Entomologist, Department of Agriculture, Rydalmere, N.S.W.

F.T.A. of Victoria

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Personal . . .

David A. Forss, Principal Research Scientist, Division of Dairy Research, C.S.I.R.O., Melbourne, will present a paper at the "Symposium on Foods: Chemistry and Physiology of Flavours" at Oregon State University on 8-10 September. While in the United States, he will visit several laboratories and will spend a week at the U.S. Army Natick Laboratories where he was formerly a National Academy of Sciences — National Research Council Visiting Scientist.

The Minister-in-Charge of C.S.I.R.O. has announced the appointment of Dr. A. T. Dick, O.B.E., D.Sc., F.A.A. to succeed Dr. H. R. Marston, D.Sc., F.R.S., F.A.A. as Chief of C.S.I.R.O.'s Division of Biochemistry and General Nutrition.

Dr. Dick was awarded the David Syme Research Prize of the University of Melbourne in 1954. He was elected a Fellow of the Australian Academy of Science in 1964 and was appointed an Officer of the Most Excellent Order of the British Empire in the 1965 New Year's Honours List.

Prefried Canned Bacon

Canned bacon, sliced and prefried, will soon go into commercial production based on U.S. Department of Agriculture research. The new convenience product, ready for the table after a minute's heating, is vacuum-packed by a processed worked out by U.S.D.A.

METAL FROZEN CRAYFISH PACK

Fresh frozen crayfish is now being marketed in vacuum sealed cans by the South Australian Fishermen's Co-operative Ltd., after tests had shown that this method was superior to plastic packs previously used for this purpose.

FOOD POISONING

SAFETY OF CANNED FOODS HIGH

Food poisoning has always been quite common and during the last war and for a number of years afterwards showed a steady increase. Although there has been a reduction in the number of outbreaks since 1959 there was in 1963 an increase of 35 per cent on the 1962 figure. This increase was mainly due to cases of *Clostridium welchii*.

In 1962 the director of the English Public Health Laboratory Service explained some of the reasons for the higher food poisoning figures. In addition to a more effective system of notification there have been many changes in the feeding habits of the nation. Also the sources of salmonellae appear to be inexhaustible — a new one is discovered almost every year.

Any food handler who adopts a casual attitude on hygiene should be reminded that there were 27 fatal cases of food poisoning in 1963. Twenty-one of these were due to salmonellae and four to *C. Welchii*. In two cases the cause was not discovered.

Particular care is, of course, needed during the summer months when most family outbreaks occur. During 1963 47 per cent of salmonella outbreaks were recorded in June, July and August. No seasonal difference was observed in outbreaks of *C. welchii*, which accounted for 40 per cent of the 149 outbreaks in hospitals, schools, restaurants and canteens. These outbreaks might have been prevented by proper attention to the cooking and storage of meat products.

In 1962 a sample group of 106 outbreaks was examined; 79 per cent of these were due to meat and meat products, the majority being due to cooked meats and made-up meat dishes. Only six were due to canned

meats. A similar sample in 1963, covering 126 outbreaks, revealed that 110 were associated with meat products. Of these, 84 per cent were considered to be made-up or processed meats. Canned meats were suspected in only two of the outbreaks.

THE ORGANISMS

Salmonellae

It has been stated that the types of foods which are likely to contain salmonellae are particularly the protein foods which come from animals but that other foods, even vegetable foods, might also be infected if contaminated with intestinal contents. The origin and spread of infection among animals, therefore, becomes of paramount importance and the food hygiene of abattoirs, etc., a vital barrier against the build-up of infection. A survey by the Public Health Laboratory revealed that effluent from abattoirs was a frequent source of salmonellae. These conclusions clearly indicate the need for attempting to combat this infection at the source — i.e. in the live animals.

Clostridium welchii

Eighty-two outbreaks of *C. welchii* food poisoning were reported in 1963 compared with 84 in 1962. The number of cases, however, rose by 160 per cent to 4,721, which is the highest recorded. It has been stated that the organism has so frequently been isolated from raw meat samples that its presence in the kitchen is almost inevitable. In view of the disquieting increase in this type of food poisoning particular attention will obviously have to be paid to the methods of cooking and storage of meat dishes.

SAFETY OF CANNED FOODS HIGH

In a paper given at a recent conference on the safety of canned

foods by Mr. T. E. Bashford and Mr. D. A. Herbert of the Research Department of the Metal Box Company, London, it was pointed out that Ministry of Health reports mentioned only 54 outbreaks of food poisoning originating from canned foods during the past four years. As there is an annual consumption in Britain of 6,000 million cans it will be seen that the safety standard is high.

The present inspection of canned foods imported at British ports was as effective as it could be. Further safeguards should be applied at the canneries where the foodstuffs originated. Canned foods are among the safest the public can buy, and the epidemics of typhoid in 1963-64 were rare events which should not be allowed to get out of perspective.

DRYING SULTANAS WITHOUT DIPPING

Some of the very first Mildura growers dried their sultanas without dipping, but they soon decided to speed up the process with chemical dips. The attractive golden-brown product is now well established on world markets.

Some buyers prefer the natural colour of undipped berries, however, and are prepared to pay higher prices for them. And now that grape-drying plants that overcome the dangers of wet weather are more widely available, some undipped sultanas might again be produced. This would give greater marketing flexibility, because undipped fruit holds a large share of the world market.

At the request of the Australian Dried Fruits Control Board, C.S.I.R.O. has begun work on undipped sultanas at the Horticultural Research Station, Merbein, Vic. Results so far are encouraging, but more work is needed before conclusions can be drawn.

Early in the 1963 drying season, when the weather was hot, dry and sunny, undipped sultanas dried on the ground in 14 days. The finished

fruit was bluish brown with the bloom intact, and it had a pleasant flavour. Later in the season, when the weather was wetter and cooler, drying had to be completed in a dehydrator.

The experiments are being conducted by Mr. G. Kerridge and Mr. M. Grncarevic.

THE PREVENTION OF BROWNING DURING DRYING BY THE COLD DIPPING TREATMENT OF SULTANA GRAPES

During the drying of grapes the yellowish-green colour of the mature fruit changes to dark brown. This browning is generally regarded as being caused by the presence in the skin of the enzyme polyphenol oxidase.

Commercially, this change can be reduced by immersing the fruit 3-5 minutes in a dipping solution consisting of an emulsion of 2 per cent dipping oil, mainly a mixture of the ethyl esters of fatty acids in a 2.5 per cent aqueous solution of potassium carbonate which increases the rate of drying.

The prevention of browning was not found to be the result of direct inactivation of polyphenol oxidase by the solution but rather due to an inhibition of the enzyme by increasing the sugar concentration. It is concluded that it is really the increased drying rate which inhibits browning, as it can also be achieved by an increased drying rate without the dipping treatment.

F. Radler (Horticultural Research Station, C.S.I.R.O., Merbein, Vic. "J. of the Science of Food and Agriculture" (15, 864, 1964).

It is well that there is no one without a fault, for he would not have a friend in the world.

— William Hazlitt

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Factors That Affect The Composition Of Cows' Milk

By Dr. F. WHITING,

Associate Director (Livestock), Research Branch Executive,
Canada Department of Agriculture, Ottawa

The special nutritional value of milk protein and the lack of such merit in milk fat have been widely recognized, and recently there has been a shift in emphasis from the fat to the protein and the solids-not-fat constituents of milk.

If it were desirable to do so, it is possible to alter the relative proportions of fat and protein in the milk of a herd and, carried further, to change the total supply of milk fat in proportion to protein in a region or a country.

There is voluminous literature on the composition of cows' milk and the factors that affect it. Emphasis in this summary is on those factors that could be used to influence milk composition should nutritional knowledge and economic factors dictate that a change in composition would be desirable.

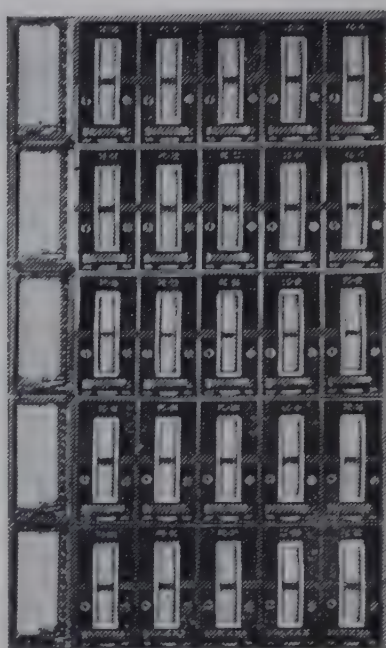
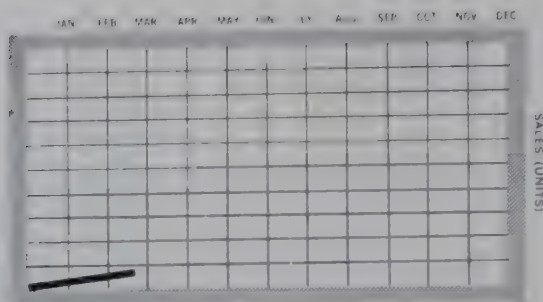
Milk is usually considered to contain approximately 87.6 per cent water, 3.7 per cent fat, 3.2 per cent protein, 4.8 per cent lactose and 0.7 per cent ash. However, very seldom would one find that a sample of milk taken from any cow had this composition. This is because the composition of milk varies according to the breed of the cow, the stage of lactation, the time of year, the age of the cow and the feed being consumed. It is well known, for example, that Jersey milk contains more fat, carotene and total solids than does Holstein milk. However, it is not as well known that the fat and protein content of milk is highest during the first month of lactation, falls to the lowest levels during the second month when yield is usually the highest

and then gradually increases to the end of lactation; that the fat and protein content fall with each succeeding lactation; that the protein content usually increases when cows are on pasture, whereas the fat content may decrease; or that the fat has a higher proportion of saturated fatty acids during winter feeding than when the cows are on pasture.

The lactose, mineral and vitamin contents are much less variable than are the fat and protein contents. However, this does not mean that they are constant. Usually the lactose, calcium, phosphorous and B-vitamin contents are little influenced by normal feeding or by other factors. On the other hand, the contents of trace minerals such as iodine, molybdenum and cobalt and of the vitamins A, D, and E, although little affected by stage of lactation, breed and age of cow, can be markedly influenced by feed.

It has been assumed by many that there is a close positive rela-

From "Food Research Notes", Research Branch, Canada Department of Agriculture, Ottawa, Food Research Information Office.



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tionship between the fat and protein contents of milk. This assumption is correct when one considers bulked samples of milk, but it is not correct when one considers the milk from individual cows or breeds, or even herds of cows. In one study, the milk of a group of cows, all of which tested 3.7 per cent fat, had a range of protein content from 2.4 to 3.7 per cent. The correlation between these two constituents of milk may reach 0.8 when bulked samples are compared but may be 0.3 or lower when individual cows, similarly fed within a breed or within a herd, are compared. This distinction is important because it indicates that, if an effort were made through breeding to select for either high protein or high fat, one would not necessarily be influencing the content of the other to the same extent.

The fat and protein contents of milk can also be altered by changes in feeding. Under normal herd management, with calvings fairly evenly spaced throughout the year, and with usual feeding practices, a herd of cows produces milk of fairly constant composition. However, it is possible to change this composition quite radically by changing the composition of the ration or the physical form of the ration. It has been known for about 20 years that, if the ratio of roughage to grain is reduced below a certain limit, the fat content will usually fall by as much as 35 per cent whereas the total yield of milk may increase and the protein content may increase or remain constant. Also, if the roughage or the total ration is fed in a finely ground form, or finely ground and then pelleted, the same changes in milk composition will take place. The feeding of unsaturated fish oils such as cod liver oil causes a similar change. This drop in the milk fat with change in ration puzzled animal scientists for a number of years. However, it has recently been found that the changes which decreased the percentage milk fat

also affected the type of fermentation in the rumen-reticulum of the cow and resulted in the formation of less acetic acid and more propionic acid. Since acetic acid is used in milk fat formation, and propionic acid in milk protein formation, the drop in milk fat could be explained. Subsequent experiments in which acetic and propionic acids have been continually infused into the rumen have substantiated these findings.

It thus becomes evident that, although the milk we receive each day at our doorstep may be of fairly constant composition, it is possible markedly to change this composition by the selection of the breed of cows that produce the milk, by further selection of cows within the breed, and by manipulation of the feeds or the form of feeds supplied to the cows. It may not be economically sound to make any of these changes now, but the means are available should the change be desirable.

DETERMINATION OF THE COLD SPENT DURING THE COOLING AND FREEZING OF FOODSTUFFS

A paper by A. Fikiin of the Canning Research Institute, Plovdiv, Bulgaria in the Bulletin of the International Institute of Refrigeration (44, 337, 1964) reports a study of the enthalpy change during the cooling and freezing of foods of widely varying moisture contents. Formulas are developed relating the enthalpy, moisture content and temperature during cooling and freezing of the food.

From these an enthalpy scale and diagram are derived which have given very accurate results at freezing temperatures down to -1°C . A correction factor is derived for use with foods freezing at temperatures lower than this.

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Public Health and Unrelated Aspects Of International Food Laws

Excerpts from a paper* by Dr. BERNARD L. OSER,
presented at an American Chemical Society Symposium
in Chicago on September 3, 1964

Differences in food laws and regulations have for years been recognized to be restrictive to international commerce in agricultural and food products. Recent efforts to eliminate tariff barriers have pointed up the fact that these laws are not, as might be supposed, based solely or even principally upon considerations of health or safety. Economic interest looms large among the unrelated factors which determine a nation's food laws. These relate not only to the protection of the consumer's pocketbook against economic cheating due to inferior quality, slack fill, or misrepresentation, but to protection of the economic interests of farmers and processors against price competition from exporting countries. Negotiations among the Common Market countries have focused attention on the extent to which food laws have served to raise tariff walls which it is planned to tear down to meet the objectives of the European Economic Community. In the light of these activities toward reaching international trade agreements, special interest attaches to the degree to which food laws of any country operate, intentionally or unintentionally, to protect against foreign competition, and to recognize the distinction between laws and regulations which have a scientific or health basis and those motivated by national economic advantage.

The need to remove unnecessary restrictions to trade among European countries was largely respons-

ible for the revival of the *Codex Alimentarius* project under the auspices of the U.N. Food and Agriculture Organization and the World Health Organization. This inter-governmental venture has been spurred on by the effort of the European Economic Community to *harmonize* food laws among the Common Market nations . . . It remains to be seen what influence these *Codex* standards will have, if any, on definitions and standards of identity already adopted in the United States.

Uniformity of food standards on a world basis is hardly to be expected, nor is it desirable since national needs and preferences may vary. Hence food standards should be drawn no more rigidly than necessary to establish the identity of the product and to prevent outright fraud; and they should be flexible enough to permit variations and improvements without sacrifice of the essential integrity of the foods.

Whatever may be the reasons for differences in food standards and regulations, whether they be cultural, esthetic climatic, technological or economic, it seems hard to justify them on grounds of health or safety. Conclusions based on nutritional and toxicological evidence rest to a major extent upon sound and sufficient experimentation with animals and on interpretation by qualified scientists. Rats recognize

*Published in full in the "Food Drug Cosmetic Law Journal", 19, 498 (1964).



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no national boundaries. If a given level of intake of a food additive or pesticide residue is deemed to be safe and acceptable for an American, it should also be safe for a European, Asian, or African. Whether or not the use of the additive is permitted, in specific foods, or at what tolerance levels, is a matter of local needs and practices.

Therefore it is of vital importance from an international standpoint that the scientific evidence upon which the safe use of direct and indirect additives is predicated and regulations are adopted should be made available not only in the original country but for the benefit and use of all countries engaged in international trade.

The importance of better international understanding with respect to the scientific and technological basis for food regulations was brought home to the Food Science Mission which was sent to Europe last December by the U.S. Department of Agriculture for the purpose of conferring with officials and scientists of the Common Market countries. It was apparent that the impression created, and in some places exploited, abroad that the use in the United States of chemicals in agriculture and food processing is indiscriminating and too liberal, stems in large measure from unfamiliarity with our laws and regulations, with the exhaustive long-term studies generally involved in safety evaluation, and with the inspection and monitoring activities of our federal and local agencies. To some extent chemical and toxicological evidence in support of the decisions taken by F.D.A. are reported in scientific literature but such papers often appear rather late and, in any case, must generally be searched out by interested parties or agencies. What is needed is to remove the cloak of secrecy that often surrounds such data and take a positive approach to the dissemination of this information to authorities responsible for

influencing or making decisions in other countries.

In summary, it may be stated that the factors which motivate and are responsible for differences in food laws among various countries are numerous. Besides considerations of health and safety they include dietary, cultural and esthetic preferences, climatic, geographic, and ecologic factors, the degree of technological advancement, financial resources, and last but not least, national self-interest. In the latter connection it must be agreed that it is the prerogative of any country or group of countries to set up tariffs or other trade barriers for frankly protectionist reasons. But, it is stretching scientific credulity to contend that foods or food components that are critically evaluated and found to be safe for one nation's population should be restricted on the ground of unwholesomeness or unsafety for another's. Better communications and understanding will go far toward establishing international agreement on matters of health or safety insofar as they affect food laws.

COOL STORAGE OF PEARS

Successful storage of pears depends on picking them at the correct time, placing them in storage without delay, quickly reducing the flesh temperature, and maintaining a uniform temperature of 30°F during cool storage. It is necessary also that the fruit be all sold before any signs of overstorage appear.

Storage in 0.0015 in. polyethylene film bags markedly improves the out-turn of the *Williams* and *Packhams* varieties, particularly after long storage periods. Further quality improvement can be obtained by storage in controlled atmospheres in gas-tight rooms.

E. G. Hall and K. J. Scott, "Agric. Gaz. N.S.W." (75, 1216, 1964).

Changes to Food Regulations — Victoria

GAZETTED 29th SEPTEMBER, 1964

Interpretation (Reg. 5)

A new insertion states "‘sorbic acid’ includes ‘sorbates’ which shall be calculated as sorbic acid”.

Colourings and Flavourings (Reg. 10)

“Ice Cream, flavoured ices and ice blocks” has been deleted from the proviso allowing colouring and flavouring without declaration. The colouring without declaration of sausage skins is restricted to casings of manufactured meat.

Cocoa and cocoa preparations may be flavoured without declaration.

Synthetic vegetable colourings, chemically the same as natural colourings are now included in “prescribed colourings”.

The F.S.C. recommendation for purity and amount of colouring has been adopted in a modified form which alters the meaning and intent of the F.S.C. recommendation.

Vitamins and Minerals (New Regulation 10C)

The standard recommended by the F.S.C. has been adopted, and as a consequence clause 6 of regulation 11 (relating to labelling of foods rich in vitamins) has been deleted. Vitamins may be added only to certain foods. There are restrictions on labelling and advertising.

Meat and Meat Products (Reg. 22)

The standard recommended by the F.S.C., prior to the amendment re meat flesh, has been adopted with the following additions:—

1. Provision requiring labelling of frozen meat.

2. Provision requiring meat of any description from any place outside Victoria must be labelled in 18 points with State or country of origin.

3. Preservatized sausage meat must be labelled in 12 points “Sausage Meat — Preservative Added”.

4. Definitions, standards and labelling requirements for meat extract, meat essence and meat juice.

5. Definition and labelling requirements for meat paste.

The F.S.C. standard includes a minimum starch content in sausage meat, and a minimum meat content of manufactured meat.

Fish Paste and Canned Fish Products (Reg. 24A)

A proviso exempts canned fish from maximum fat or oil of 25 per cent when the words “in oil” follows the name of the fish on the label.

Milk (Reg. 30)

A new clause prohibits the presence of penicillin and other antibiotics. The F.S.C. recommended standard for flavoured milks has been adopted.

Condensed Milks (Reg. 32)

The standard recommended by the F.S.C. has been adopted. The changes include a variation in labelling requirements for condensed skim milks. Borates are not permitted.

Malted Milk Powder (Reg. 34)

The standard recommended by the F.S.C. has been adopted. This

permits up to 5 per cent moisture.

Cocoa and Cocoa Products (Reg. 40)

The F.S.C. recommendation in regard to milk chocolate in the form of hollow moulded goods has been adopted.

Sauces and Chutneys (Reg. 42)

Sorbic acid may be used with limitation in tomato sauce or chutney.

Pastry Mixes and Pastry (Reg. 48)

Propionates and sorbates are again permitted, within limits, in pastry mixes.

Marzipan (New Reg. 48A)

The F.S.C. standard for Marzipan has been adopted. This defines ground almonds and ground kernels. It defines, standardizes and prescribes labelling requirements for Marzipan, almond paste, almond icing, kernel paste, imitation almond paste and imitation marzipan.

Ice Cream, Flavoured Ices and Ice-Blocks (Reg. 49)

The provisions for mixes in the F.S.C. standard for Ice Cream and Related Products have been adopted. These define, standardize and prescribe labelling requirements for ice cream mix, flavoured ice mix, ice block mixes and ice confection mix.

Lemon Butter, Fruit Flavoured Spread and Fruit Flavoured Filling (Reg. 55)

The F.S.C. standard dated March, 1963, has been adopted with the omission of clauses for imitation fruit flavoured spread. Lemon butter, fruit flavoured spreads and fruit flavoured fillings are defined and standardized. The regulation is different in certain respects to the F.S.C. standard as amended October, 1964.

Crushed Fruit, Fruit Squash and Fruit Squash Cordial (Reg. 56)

Sorbic acid may be used as a partial or total replacement for benzoic acid.

Fruit Juices (Reg. 57)

As a consequence of the adoption of the Vitamin and Mineral regulation Clause 6(a), relating to labelling and vitamin content, has been deleted. Sorbic acid may be used as partial or total replacement of benzoic acid in fruit juices or extracts and concentrated fruit juices or extracts.

Fruit Juice Cordials (Reg. 58)

Raspberry Vinegar (Reg. 59)

Flavoured Cordial and Concentrated Flavoured Cordial (Reg. 60)

Imitation Cordial and Syrups and Conc. Imitation Cordials (Reg. 61)

Non-Excisable Fermented Drinks (Reg. 62)

Summer or Temperance Drinks (Reg. 63)

In all these regulations sorbic acid is permitted as a partial or total replacement of benzoic acid.

Determination of the Total of Sulphur Dioxide in Beverages, Concentrates and Vinegars

By modification of the alkalimetric method of Monier-Williams a method for determination of the *total sulphur dioxide* in beverages and concentrates, derived from fruit, has been developed.

This method, based on the distillation of sulphur dioxide in methanol solution acidified with phosphoric acid, is free from the defects of the other alkalimetric acids. The precision of the results obtained with this method proved excellent for sweetened and for fermented beverages, fruit concentrates and vinegars.

H. Tanner ("Mitt. Geb. Lebensmitt. u. Hygiene", 54, 158, 1963).



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For a true cheese flavour you will find KRAFT Grated Powders the finest available. In Cheddar, Romano, Parmesan, Swiss or Blue flavours, KRAFT Grated Powders are specially prepared for use by bakers, biscuit manufacturers, confectioners, and manufacturers of specialty cheese items. Available coloured or natural, they may be blended with oil for spraying on popcorn and other specialty items. KRAFT Grated Powders guarantee you consistent quality every time. KRAFT GRATED POWDERS are available in 80-lb. 4-ply paper bags with polythene liners, at all KRAFT Depots.



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ECHOES OF SILENT SPRING

All involved in the manufacture, sale or use of pesticides, and in the production and marketing of food-stuffs, have been somewhat on the defensive since 1962, when the late Rachel Carson's diatribe, "*Silent Spring*" condemned the use of pesticides as dangerous to man and lethal to wildlife. Recently the Surveys and Investigations Staff of the U.S. House Committee on Appropriations reported on all aspects of the effects, uses, and control of agricultural pesticides. This report is a most thorough, objective and factual document on this subject and should be required reading for anyone interested in any way in the use of economic poisons. Following are some of its comments on the Carson opus:—

"... The defoliation of many thousands of acres of forests by insects is a conspicuous example of nature out of balance, and an insect-control programme is an effort to restore the balance. Similarly, the housefly with its disease organisms and the Anopheles mosquito with its malarial parasites are just as much a part of the balance of nature as are brook trout, robins, and deer.

"The author stated that vast acreages have been treated with chemical pesticides. The U.S. Department of Agriculture has reported that less than 5 per cent of the total acreage in the 50 States ... 15 per cent of the acreage planted to crops, and 5 per cent of the forests has been so treated, ...

"The author stated that chemical pesticides were being used with 'little or no advance investigation of their effect on soil, water, wildlife, and man himself', which statement ignored the numerous studies being conducted on such effects. Without proof, the author indicated that pesticides will produce cancer,

sterility, and cellular mutations in man, and supposed that pesticides will eventually extinguish plant life, wildlife, aquatic life, domestic animals, and man. Thus the book created an atmosphere of panic, foretold an impending disaster, and barely mentioned the immensely useful role played by pesticides in the U.S. economy.

"... Had the author chosen to limit her case to the adverse effects of the misuse of pesticides on ... wildlife, her position would have been unassailable ... However, Miss Carson extended her conclusions to supposed ill effects of minute amounts of pesticides on human beings over a prolonged period and this is the major reason that her book has been criticized by physicians and scientists.

"In regard to the author's implication that fish, wildlife, domestic animals, and man would be destroyed by chemical pesticides, many outstanding authorities pointed out ... that this implication is refuted by the evidence of one's own eyes ... deer and other wildlife are more plentiful than before the advent of modern pesticides, and man is entering into the era of a population explosion, and, in the United States, man has achieved his highest longevity.

"The scientists interviewed by the staff stated that, in a matter so closely related to the health and well-being of the American public, the reader of the book was entitled to a balanced account of the facts regarding pesticides; but that, instead, Miss Carson chose examples that would bolster her thesis, but ignored many points that would have run counter to her point of view. As a consequence, the book un-

From "What's New in Food and Drug Research".



A hop ahead

The "glass can" for beer.

We think it's one of the best moves since hops were first used in brewing.

Apparently beer drinkers do, too. (Where the "glass can" has been introduced, overall bottle sales have increased — while sales of 26-oz. bottles have continued to rise.)

Beer drinkers like the "glass

can" because it's so compact for storing in the refrigerator.

It takes up so little space yet it holds two full glasses of beer.

Glass protects the true beer taste. It has a hygienically sealed pouring lip.

The "glass can" needs no artificial lining. It's lined in pure clean glass.

Manufacturers proud of their

products bring them to you in glass.

And beer is preferred in glass (just watch the sales!).

No wonder Glass Sells Faster.



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AGM/152A

necessarily caused public concern over the ill effects of chemical pesticides on the public health."

The House Committee investigators discuss in detail the most publicized incidents relating to the use of pesticides — the *cranberry* incident; contaminated milk in Maryland, Pennsylvania, and West Virginia; the Long Island cauliflower situation; the cheese situation in Utah and a number of fishkills. It discusses the various U.S. Department of Agriculture eradication programmes, and it offers some important insights to the scientific basis used by the Food and Drug Administration in setting tolerances, F.D.A.'s liaison with other interested government agencies, both within and outside Health, Education, and Welfare, and with industry.

SOFT DRINK BOTTLERS PUBLICITY

Soft drink manufacturers throughout Australia are to receive a special *information kit* as part of a national programme to promote public knowledge of the industry and its role.

The kit has been prepared by the Federal Public Relations and Advertising Committee of the Australian Council of Soft Drink Manufacturers to provide a ready-reference fact file on the £27 million industry and its more than 520 plants spread throughout the country.

The kit is designed to:—

Provide the basis of addresses to women's clubs, business functions, or other appropriate community gatherings.

Make available feature articles on the industry, for placement with local newspapers for supplements, etc.

Give a detailed guide to the effective operation of a plant tour.

Make available general information for use in personal discussions, etc.

Engineering Aspects of Immersion Freezing of Poultry

The general problems are examined with special reference to freezing times (F.T.) in liquids (CaCl_2 29 per cent wt., propylene glycol 50 per cent vol., and glycerol 56 per cent) and appearance. F.T. follows Plank's equation for long cylinders ("*Z. Kälteindustrie*", 1932, 39 (4), 56) and experimental results obtained for F.T. using cylindrical gelatin models in different immersion liquids are presented together with data obtained for chickens (2.5, 5.0 lb) and turkeys (12, 20, 30 lb).

Initial appearance of the skin colour is important since this remains unless the pigmented surface layer is removed during defeathering. Almost any desired colour (chalky-white, pink, yellow pink, darkish red) can be achieved, max. whiteness being attained at liquid temp. 0 to -10°F and more natural appearance in the $10-20^\circ\text{F}$ range. These variations at the indicated temp. are discussed, together with those achieved with air blast freezing.

C. P. Lentz and L. van den Berg, "*Ashrae J.*", 5 (9), 42-46 (1963); "*J. Science of Food & Agriculture*", 15 (2) i-117 (February, 1964).

FRUIT-MILK CONCENTRATES

The U.S. Department of Agriculture, Agricultural Research Service reports a study carried out in Italy on the stabilization of concentrated mixtures of milk and fruit juice.

It was found that apple and quince pulps gave complete stabilization in many combinations with many different fruits. It was reasoned that the pectin of apple and quince stabilized the casein in the milk thus preventing coagulation.

Americans are drinking more milk and the per capita sales have risen to 126 quarts per person.

Roche Carotenoids will colour your food products pale yellow or yellow-red



or any shade in between

Which shade has more sales appeal in your product — rich yellow or golden-orange? With ROCHE BETA-CAROTENE you can get either shade.

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pinpoint your colour to shades in between.

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BETA-CAROTENE and APO-CAROTENAL are also nutritious — they're provitamin A which means

they can often supply enough vitamin A to supply a label claim. ROCHE BETA-CAROTENE and APO-CAROTENAL are each available as 20% Suspensions for use in oil-based foods and as 15% water-soluble powders for incorporation into water-based foods.

For more information on ROCHE BETA-CAROTENE or ROCHE APO-CAROTENAL call or write to:—



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NEW CLING PEACH VARIETIES

By K. L. AVENT,

Manager, Horticultural Research Station, Tatura

It is some years now since new cling peach varieties were introduced from overseas into Victoria. Those brought in last are under test at Tatura Horticultural Research Station, but none has yet been proved sufficiently for commercial release.

There has been a new burst of interest recently, as a result of the latest breeding programmes overseas. However, action proceeds cautiously because of the very serious risks of introducing insect pests and diseases from other countries on propagating material.

There is strict quarantining and thorough checking for health, including extensive tests for virus diseases, before the material is even released for field trials. The payoff is in the protection which this action gives the fruit industry from new pest control problems.

These are the latest introductions:—

From South Africa, a fresh range of four varieties named Oom Sarel, Izak Melherbe, M. W. Black, and Jan Neethling. These were introduced by the N.S.W. Department of Agriculture, who have agreed to provide Victoria with budwood. They were bred by the South African Department of Agricultural Technical Services.

From U.S.A., four varieties bred by the University of California for improved flavour as a canned product, and released in California about 18 months ago. These are from further breeding based on the Dix series, some of which were obtained earlier at Tatura. The varieties are Jungerman, Andross, Klamt and McKune. They

were introduced on the suggestion of well-known fruit-grower and cannery director, Sir John McDonald.

All this material is either under quarantine or newly released, and will not be available for general use for several years. However, growers will be interested to watch them in their firsts tests at Tatura.

HYDROSTATIC STERILIZERS

The hydrostatic cooker relies on two columns of water to create the pressure necessary to maintain the desired steam processing temperature in an intervening steam chamber, thus eliminating entrance and exit valves. The incoming cans are carried down through a water column; make one or more passes through a steam chamber; and are carried up and out of the cooker through a cooling water column. In most designs the height of the water columns may be adjusted to obtain any desired sterilizing temperature; for example, a column height of about 24 ft would provide 240°F, and 35 ft would provide 250°F.

Four hydrostatic cookers are described in "N.C.A. Research Information" No. 93 (Aug., 1964). They are: Hydron, by Mitchell Engineering Co., London; Hydromatic, by Stork of the Netherlands; Carvallo, manufactured in France; and Hydroflex, produced by F.M.C. Corp., San José, California.

Americans have more time-saving devices and less time than any other group of people in the world.

— Duncan Caldwell

SECOND INTERNATIONAL SYMPOSIUM ON "THE CHEMISTRY OF COFFEE"

The Second International Symposium on "*The Chemistry of Coffee*", organized by the Institut Francais du Café et du Cacao, was held at the Centre National de la Recherche Scientifique (C.N.R.S.) in Paris on May 3-5, 1965. It was attended by about 90 delegates from 16 countries, including Great Britain and East Africa.

The subjects discussed included the constituents of coffee and methods of their analysis, aromatic constituents, the biosynthesis of caffeine, physiological effects of coffee, and the technology of coffee and coffee products. Reports on the bibliography, standardization and legislation of coffee, on methods of analysis, on technology, and on

organoleptic effects and physiological actions were presented by the working parties that were set up at the First International Symposium on the Chemistry of Coffee in 1963. These working parties are to continue with their investigations, and new working parties have been set up to co-ordinate coffee odour research, and to investigate methods of determination of soluble substances, chlorogenic acid and trigonelline in coffee. The proceedings are to be published in special issues of "*Café Cacao Thé*", in Paris later this year. The symposium concluded with the formation of the International Scientific Association of Coffee (I.S.C.A.O.) and with a proposal to hold a third symposium in Trieste in May, 1967.

The offices of I.S.C.A.O. are at 34 Rue des Renaudes, Paris 17e, France.

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FOOD IRRADIATION SYMPOSIUM

BOSTON, 28th TO 30th SEPTEMBER, 1964

Three hundred participants, twenty-six from abroad, took part in this symposium. Two days were devoted to papers and discussions, and a third to visits to the new seafood irradiation centre at Gloucester, Massachusetts (250,00 Ci of Cobalt-60), and to the irradiation facilities of the U.S. Army Centre at Natick (Co-60 source of 1.3×10^6 Ci, and 24 MeV electron accelerator). On this occasion, all the participants were able to eat irradiated products; beef, chicken, shrimps, crayfish, halibut, and bread. It is now very difficult to distinguish these from non-irradiated products; large-scale tests with Army personnel confirm this opinion.

The main conclusions of the symposium were:—

(1) There is now a greater industrial interest in food irradiation, as evidenced by a larger industrial participation than at previous symposia. The authorizations granted in the United States: grain, potatoes, and ham, are responsible for this interest. The construction of a privately financed irradiation plant in Canada for the treatment of potatoes proves that such applications are becoming economically competitive. This plant will begin operation in June, 1965.

(2) The most immediate applications remain those requiring the smallest doses: treatment of tubers, grain, fruit, or the destruction of salmonellae in eggs and chicken.

(3) The treatment of seafoods will not be acceptable until a detailed study has been made of the behaviour of *Clostridium botulinum*.

(4) There is continuing and vigorous controversy between the supporters of radioactive sources and of accelerators. In connection with the latter, a novel method of focusing was reported by which large thicknesses of material can be treat-

ed with uniform doses of high energy X-rays.

(5) Wholesomeness tests continue to yield no evidence of harmful effects of food irradiation.

NEW METHODS FOR EXAMINING HEADSPACE GASES

A rapid and convenient method is described by which headspace volume, pressure and gas composition may be determined on the same can. The technique utilizes an improved sampling device that allows a sample of headspace gas to be removed for analysis by gas chromatography.

P. W. Board and R. G. P. Elbourne: Laboratory Examination of Canned Foods, pt. 20. "C.S.I.R.O. Food Pres. Quart.", 24, 25. 1964.

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| 3 WORLD TYPE SEMI-AUTOMATIC LABELLERS | £225.0.0 each |
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STANDARDS

Methods of Testing Essential Oils

Addendum No. 1: 1964 to B.S. 2073
(PD 5393) 15: Determination of Lead
2s. 6d.

Determination of lead (expressed as ppm) in essential oils, by absorptio-metric measurement of lead dithizonate in solution, after removal of volatile components of the oil. Also preparation of *lead-free* reagents for the method.

Recommendations for Estimating the Dryness of Saturated Steam

3812, 1964. 6s.

Basic requirements for apparatus; procedures, calculation.

Proposed Standard Symbols for General Package Handling

The Standards Association of Australia is seeking constructive criticism and comment on draft Australian recommendations for the pictorial markings of general handling instructions on goods, issued as Doc. 964.

Damage to goods through mishandling of packages causes a serious economic problem in transportation. Much of this damage is due to failure of personnel handling the goods to understand written instructions marked on the packages. The seven pictorial markings recommended in Doc. 964 are designed to supplement any written instructions.

The symbols cover the instructions *Fragile* (or *Handle with Care*), *Use no Hooks*, *This Way Up*, *Keep Away from Heat*, *Sling Here*, *Keep Dry*, and *Heavy Weight This End*. This draft includes details regarding the colour, number, locations and size of the symbols, together with illustrations of each one, and two illustrations of packages marked with symbols.

The symbols recommended in Doc. 964 closely resemble those included in the proposed international series being prepared by the International Organization for Standardization Technical Committee 88. The markings are for instructions for the general category of goods only. Symbols covering the handling of dangerous goods are under separate consideration.

Copies of Doc. 964 are available from the Headquarters of the Association, 157 Gloucester Street, Sydney, and branch offices in state capitals and Newcastle. Comment on the draft is invited from organizations interested or experienced in the transportation of goods, particularly those engaged in the export trade. Such comment should reach the Association before 31st October, 1965.



MODERN TECHNIQUES FOR FOOD LABORATORIES

The C.S.I.R.O. Divisions of Food Preservation and Dairy Research have arranged for a series of talks and demonstrations on modern techniques for food laboratories to be delivered at the C.S.I.R.O. Division of Dairy Research, Graham Road, Highett, Victoria, on Wednesday and Thursday, November 10 and 11, 1965. The demonstrations — on gas chromatography, thin layer chromatography, measurement of temperature and humidity, and microbiological techniques, attracted a large following in Sydney in 1964, and they are being repeated for the convenience of food technologists in southern States. Programmes and enrolment forms may be obtained from the Technical Secretary, C.S.I.R.O. Division of Food Preservation, Box 43, P.O., Ryde, New South Wales.

1965 Cereal Chemistry Conference

The Cereal Chemistry Division of The Royal Australian Chemical Institute will hold its Fifteenth Annual Conference at Terrigal, N.S.W., from 27th to 30th September, 1965. A very cordial invitation is extended to all interested in cereals, cereal products and cereal science.

An informal reception and welcome to delegates will be held at the Florida Hotel on the eve of the conference, commencing at 7 p.m. on Monday, 27th September, 1965. Delegates may register at the Hotel during the afternoon.

Registration fee for R.A.C.I. Members is £6/10/- and for non-members, £8/10/-. Further details are obtainable from A. J. Harris, Andrew Baker Pty. Ltd., P.O. Box 22, Homebush, N.S.W.

PROGRAMME:

MONDAY, 27th SEPTEMBER

7.00 p.m. Informal Buffet Reception. Welcome by Mr. C. W. Bridges-Maxwell, M.P.

TUESDAY, 28th SEPTEMBER

a.m. Conference Opening. "Wheat Genetics and the Breadmaker", Dr. W. J. R. Boyd, University of Western Australia. W.A. "A General Review of Hybrid Wheat Research in America and Australia", P. Wilson, DeKalb Shand Seed Company Pty. Ltd., N.S.W. MORNING TEA. "Modern Trends in Australian Wheat Breeding", N. F. Derera, North West Wheat Research Institute, N.S.W. "Biscuit Wheat Production under Irrigation", W. C. Barnes, Department of Agriculture, N.S.W. Wheat Sub-Committee Report. Wheat Quality — General Discussion.

p.m. LUNCH. "Latest Status of the Rheological and Physical Measuring Technique in the Cereal Industry", C. W. Brabender, Brabender OHG, Duisberg, W. Germany. "The Non-linear Viscoelastic Behaviour of Wheat Flour Dough", W. J. Wallace, Bread Research Institute of Australia, N.S.W. AFTERNOON TEA. "Design and Interpretation of Physical Dough Testing Experiments", K. C. Mander, State Laboratories, Victoria. Physical Dough Testing Sub-committee Report. Test Baking Sub-committee Report.

WEDNESDAY, 29th SEPTEMBER

a.m. "Some Fundamental Properties of Enzymes and Enzyme Systems", J. Williams, The University of N.S.W., N.S.W. "Fermentation by Yeast in Dough and in De-

finied Media", P. J. Meddings, Barretts Food Co., Vic. MORNING TEA. "Principles of Continuous Culture of Micro-organisms", Dr. F. J. Moss and Professor G. H. Roper, The University of N.S.W., N.S.W. "A Rapid, Mechanical Test Baking System for Pre-Purchase Testing of Wheat in New Zealand", R. W. Cawley, Wheat Research Institute, Christchurch, N.Z. "Test Baking", H. C. Gluskie, Weston Research Laboratories, N.S.W.

p.m. LUNCH. Tour and visit to Vales Point Power Station. Barbecue Dinner.

THURSDAY, 30th SEPTEMBER

a.m. "Some Properties of Edible Fats and Oils — A Review", G. Greethead, Streets Ice Cream Pty. Ltd., N.S.W. "Binding and Extractability of Wheat Flour Lipids After Dough Fermentation", M. Wootton, C.S.I.R.O. Wheat Research Institute, N.S.W. "Properties of Fats for High Temperature Bread Doughs", P. E. Marston, Bread Research Institute of Australia, N.S.W. MORNING TEA. "Pumpable Plastic Shortenings", K. J. Kearney, Provincial Traders Pty. Ltd., Q'land. "Trends in the Glucose Industry", G. N. Kesby, Andrew Baker Pty. Ltd., N.S.W. "The Use of the Coleman Nitrogen Analyser under Practical Conditions", Dr. M. H. R. Cosgriff, Nabisco Pty. Ltd., Vic. Analytical Sub-committee Report.

p.m. Check sample Sub-committee Report. Problems Session. LUNCH. "The Industrial Approach to Food Standards", Dr. K. T. H. Farrer, Kraft Food Pty. Ltd., Victoria. "The Concept of 'Acceptable Daily Intakes for Food Additives'", Professor S. E. Wright, University of Sydney, N.S.W. AFTERNOON TEA. Business Session. Conference Dinner. Guest Speaker: The Honourable L. J. Herron, Chief Justice of N.S.W.

Rapid Detection and Determination of Mineral Oil on Dried Fruit

A rapid method for the detection and determination of mineral oil on dried grapes, previously dressed with oil to prevent stickiness, is described. The oil is extracted with cold chloroform, then separated and detected by thin layer chromatography. The smallest detectable amount is 0.5 µg of oil on the chromatogram or 0.01 per cent on the dried fruit.

F. Radler and M. V. Grncarevic, "J. Agric. Food Chem.", 12, 266, 1964.

FLUIDIZED-BED BLANCHING

A highly efficient method for the blanching of vegetables intended for preservation by canning, dehydration, or freezing has recently been investigated by research officers at the Division of Food Preservation, C.S.I.R.O. This method adapts the fluidized-bed principle to the blanching operation, and an apparatus operating on this principle is the subject of a recent Australian patent application by C.S.I.R.O.

In conventional methods of blanching the produce is exposed for a few minutes to hot water or steam in order to expel unwanted gases and to inactivate enzymes that would otherwise induce discolouration, decomposition, or off-flavours during storage. In the C.S.I.R.O. fluidized-bed blancher small vegetables such as peas, or comminuted vegetables such as diced carrots, are levitated by a stream of air and steam. Because the *fluidized* particles are maintained in continuous motion their surfaces are fully exposed to the heating medium, and under these efficient conditions of heat exchange satisfactory blanching is effected in only 30-60 sec., in contrast to 2 min. or more required in existing commercial equipment.

The reduction in blanching time rendered possible by the new equipment is a clear advantage. Because the total heat treatment is less severe than that imparted by conventional blanching methods the quality of the processed vegetables is better.

There is also less leaching out of soluble constituents, and the equipment is not subject to the accumulation of certain spoilage organisms that are capable of thriving under relatively hot conditions.

1964 Baby Food Sales

In 1964, 100,000,000 pack-units of baby foods were sold in Australia. This represents an advance of 21 per cent over the sales volume in 1963.

U.K. BABY FOOD IN GLASS CONTAINERS

Gerber baby foods, manufactured by Brown & Polson Ltd., are to be marketed in the U.K. in 4½ oz. and 7½ oz. glass jars. This move may lead to a 5 per cent increase in total glass container usage. The new baby food jars are sealed with a White Cap Quick Twist closure.

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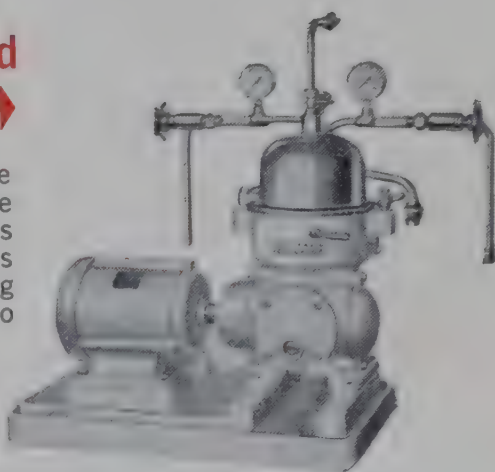
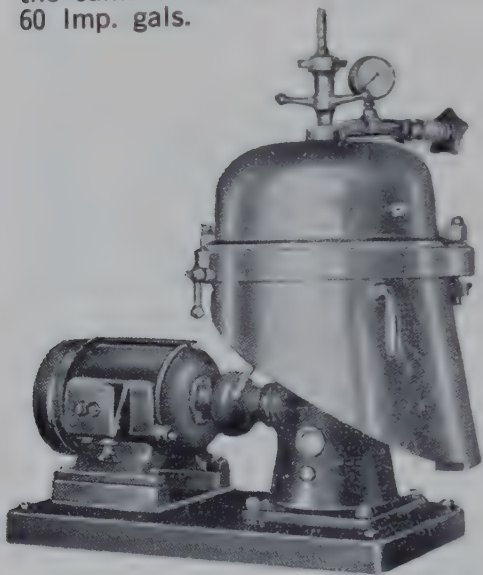
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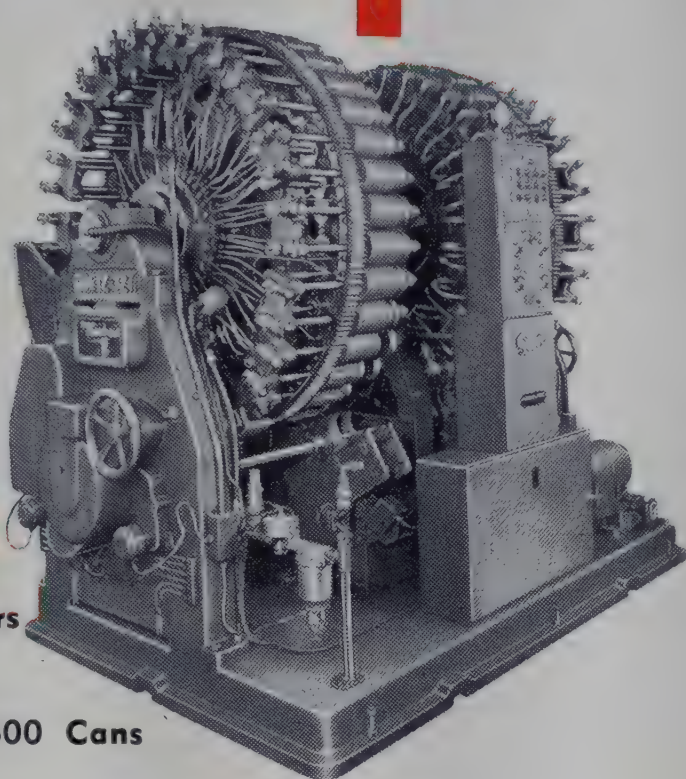
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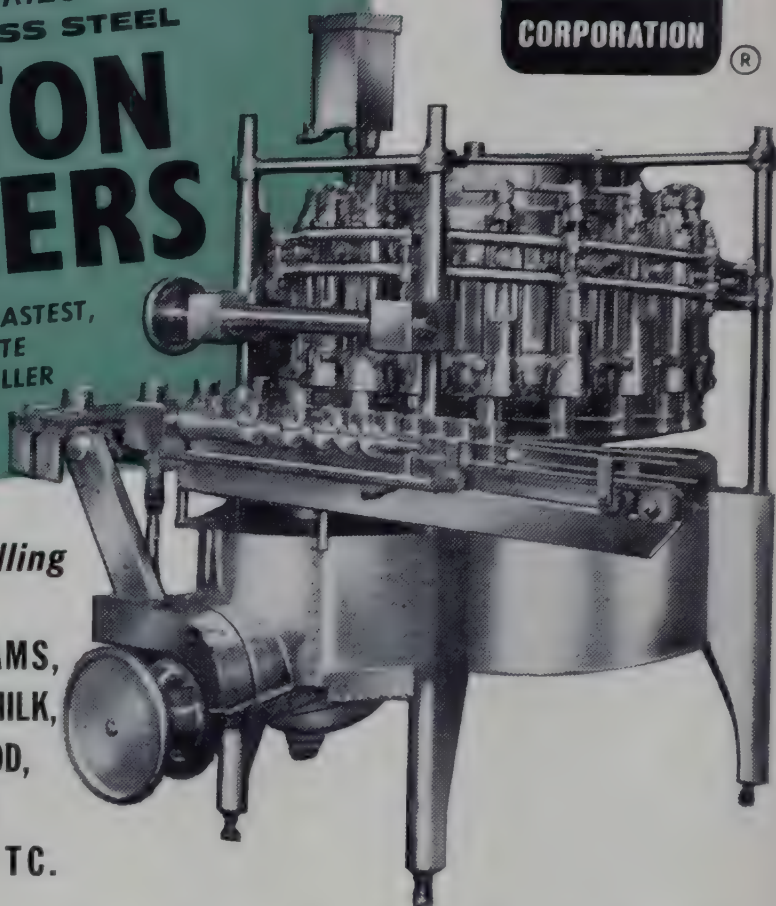
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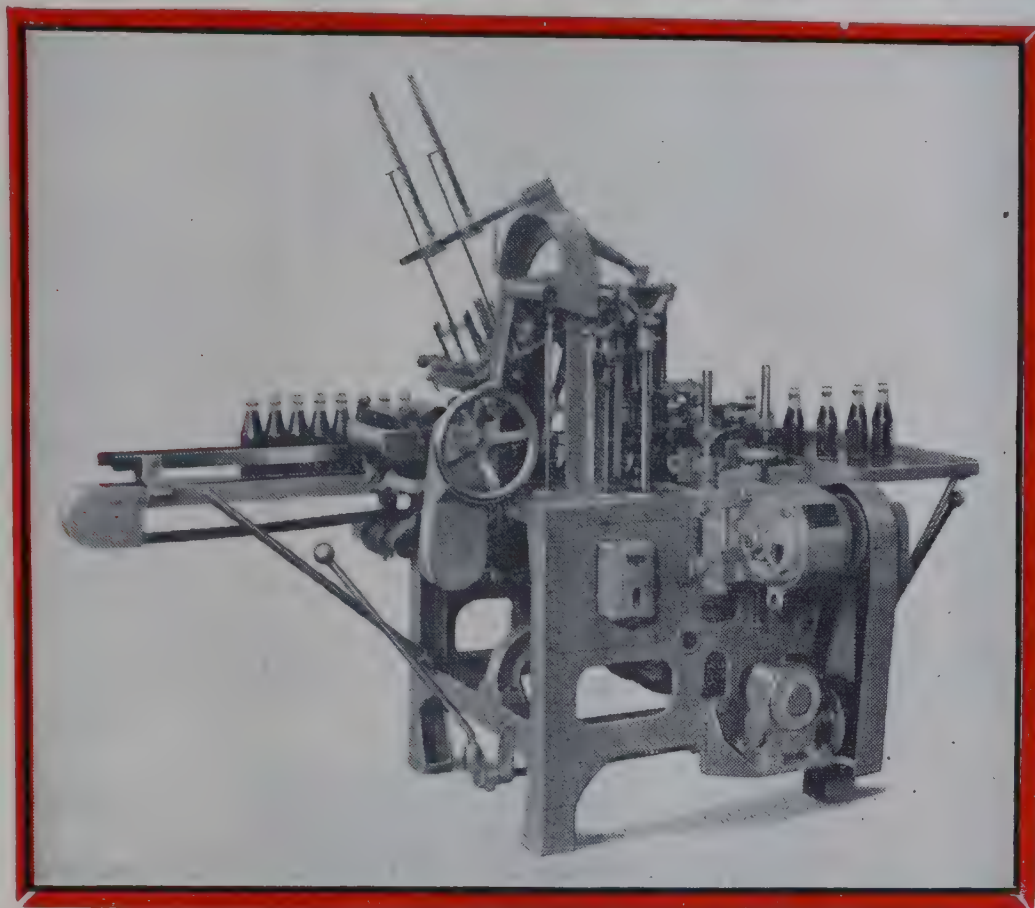
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Acting Editor:

R. A. EDWARDS, A.S.T.C., B.Sc., Ph.D.,
Senior Lecturer in Food Technology, The
University of New South Wales.

Business Manager:

S. M. ADAMS.

Office:

12 O'Connell Street, Sydney, N.S.W.
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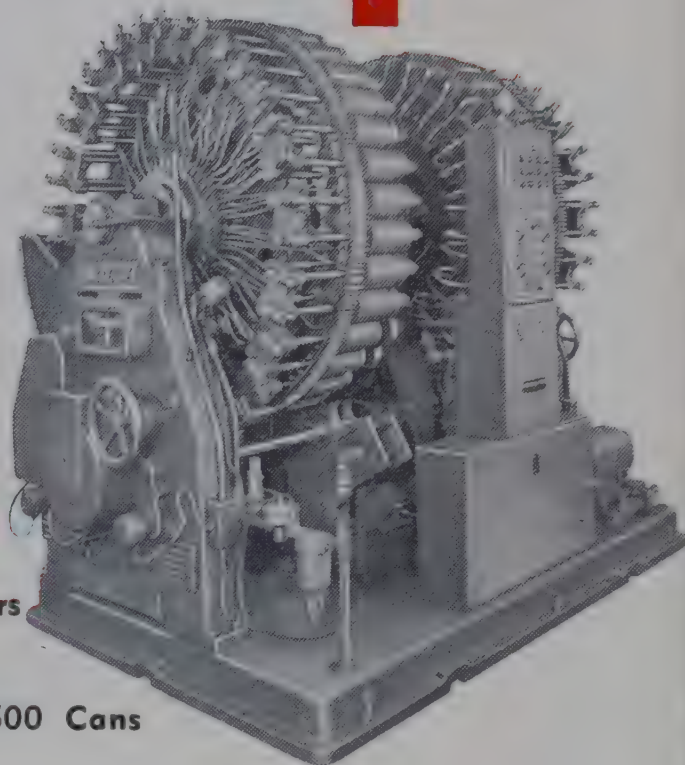
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EDITORIAL...

U.N.'s 20th Anniversary

The 20th Anniversary of the United Nations was recently celebrated in San Francisco, the city that saw the signing of the U.N. Charter on 26th June, 1945. Since that time the social and humanitarian functions of the U.N. have been reflected in its extensive aid programmes and in the work of many of its specialized agencies. In particular, the Food and Agriculture Organization has been primarily concerned with the basic social dilemma of the second half of this century — namely, to reach the horizon on which the problems of the hungry nations are solved.

The problems are immense. The Population Reference Bureau of the United States has recently estimated the current world population to be 3,283 million. United Nations figures indicate that by 1980, it is expected to be 4,300 million, and by the turn of the century, only thirty-five years distant, about 7,000 million — more than double the 1965 figure. Moreover, the chief expansion in population is occurring in those two-thirds of the world's people, in Asia and Latin America, where there are no signs of a control of birth rate but an ominous decline in per capita food production. A decade ago there was some reason for optimism, since food production was rising faster than population, but in the last four years the position has changed, with population winning the race.

To predict world populations beyond the year 2000 is little more

than an exercise in statistics, for the problems are much closer to hand than that. According to the U.S. Department of Agriculture, Asia, Africa, Latin America and the Middle East could be in the grip of famine by the 1970's. Not all such predictions need eventuate to produce a calamity unique in the history of modern man.

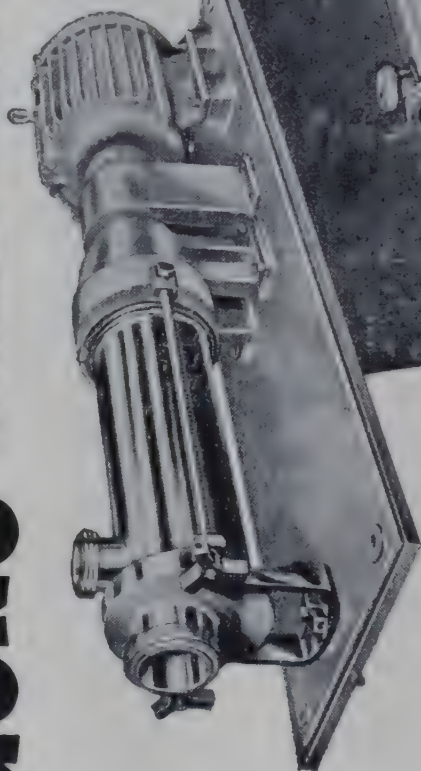
These are the problems that face the international body on its 20th anniversary.

Recently two major bodies of F.A.O. met in Rome to study the problems and to establish the state of world agriculture as of mid-1965. The meetings were sombre, pervaded by the knowledge of mounting problems in world food and agriculture, of growing difficulties in agricultural trade, and of increasing demands from the less-advanced countries for help in tackling their problems and planning their own development. Dr. B. R. Sen, Director General, warned the meetings that *"we have already entered a decisive period in which the battle against poverty, malnutrition and hunger will be won or lost"*.

Arising from these meetings, recommendations have been made for a review of F.A.O.'s organizational structure, and for the need of bold new measures if the less-advanced countries are to speed their economic development. There would be few who would not wish F.A.O. success in its new ventures as the situation is critical and time is fast running out.

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Milk Powders For Recombined Dairy Products

By L. L. MÜLLER,

C.S.I.R.O., Division of Dairy Research, Highett, Vic.

With the rapid development of Australian interests in recombining plants needing large tonnages of skim milk powder, the adaptation of techniques of a milk processing factory to the spray drying plant has become an urgent problem. Some information on this problem is emerging through research in Australia and overseas, and through the efforts of the powder plants.

INTRODUCTION

Until recent years all dairy products have been manufactured in those areas in the world where the milk is produced. There has emerged as a result a technology based on treating the milk according to its characteristics in the particular time of the year. It is well known, for example, that a factory producing a canned, sterilized evaporated milk has to vary throughout the year the preheating conditions prior to evaporation so as to obtain reasonable uniformity in behaviour of the concentrate during sterilization. Similarly a sweetened condensed milk factory varies the preheating applied to the original milk to achieve uniformity in viscosity and age thickening characteristics for the product.

In the last few years the high cost of transporting the water which is a major component of liquid dairy products and the efforts of underdeveloped nations to improve their balance of payments situation and increase employment opportunities in the country has led to development of recombined dairy

products manufacture. The recombining plants receive their basic raw material — milk, in the form of skim milk powder and anhydrous milk fat. Theoretically these plants could have obtained milk powders subject to minimal heat treatment, recombined them with water in the concentration normal for fluid milk and then have proceeded to preheat as in conventional plants. In fact, the high cost of removing by evaporation water added in this way rules out this method and these plants therefore seek milk powders in which the required uniformity of behaviour during processing has been inbuilt by the spray drying plant. The spray drying plant has therefore been asked to undertake some of the tasks of an evaporated or sweetened condensed milk factory.

POWDER FOR EVAPORATED MILK

In the conventional process for making evaporated milk the milk is standardized to a predetermined

An address to the Winter School on the Spray Drying of Milk, The University of New South Wales, 17th-21st May, 1965.

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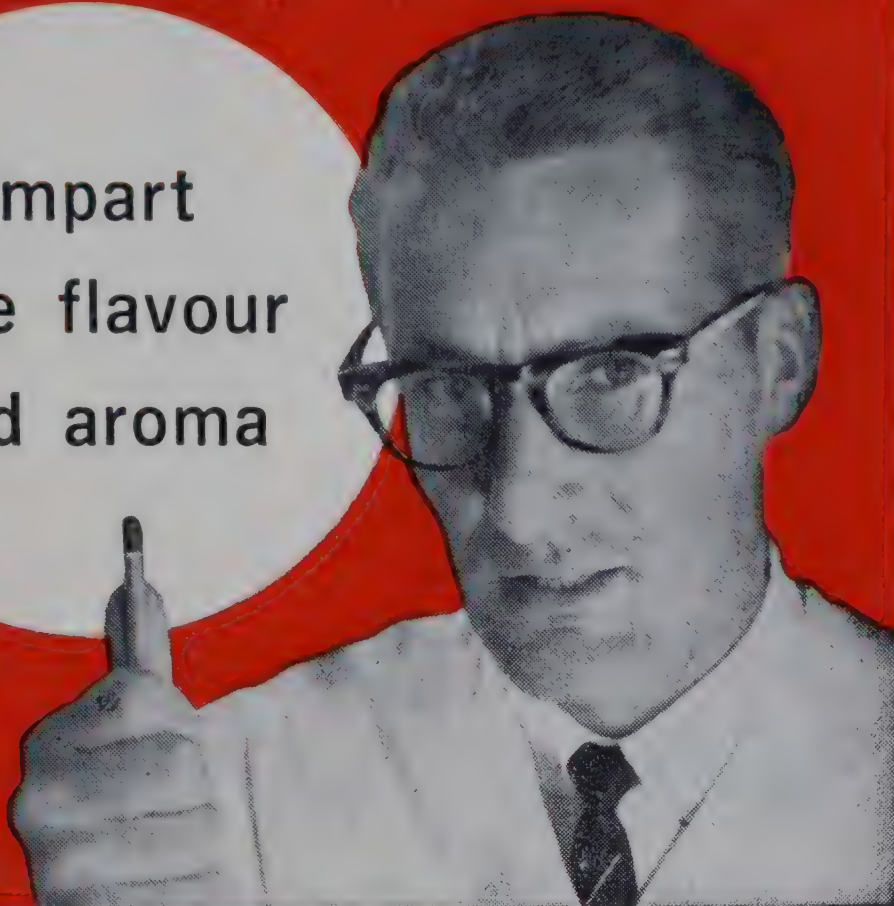
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fat-solids-not-fat ratio, concentrated and then subject to pilot sterilization trials to determine the level of stabilizer needed to prevent coagulation but to give a slight viscosity increase during sterilization in cans. The preheating of the original milk is adjusted with season as this is known to vary the behaviour of the concentrate to the usual stabilizer, disodium phosphate.

The recombined evaporated milk process involves mixing the ingredients to give a final concentration of 8% butterfat, 18% solids-not-fat and 74% water. Pilot scale determination of stabilizer levels is then carried out as normal. The early information available when the first supplies of skim milk powder were shipped to the Australian plant in Manila suggested that powders complying with the A.D.M.I. medium-heat standard would be suitable. However the milk made with powders within this standard were found often to coagulate or be difficult to stabilize during sterilization.

HEAT STABILITY TEST

To gain information on the factors involved in this variable behaviour of powder a heat stability test was devised. It aimed to simulate conditions in recombined evaporated milk manufacture the powder being dispersed as a 20% solution, assuming a powder moisture of 3%, and weighing aliquots into 3 x 1 oz. McCartney bottles. One ali-

utes in a boiling water bath and then immersed in a glycerol bath accurately maintained at 120°C. The contents were inspected at 3 minute intervals for the first signs of coagulation.

Some features of the test require stressing. Accuracy in weighing the powder and water and compensating for the additions of stabilizer solution is essential. The relationship between powder concentration and coagulation time is logarithmic and relatively small errors can have large effects. However it was found that the error in assuming a 3% moisture for powders ranging normally from 2 to 4% was within the accuracy of reading the coagulation times. Accurate control of the temperature of boiling water and glycerol baths is also important. Precautions are necessary to guard against the possibility of a McCartney bottle exploding from the pressure generated — a safety screen.

TYPICAL FINDINGS

Powders examined with this test generally fell into 4 categories as illustrated in Figure I.

Experiments in collaboration with dairy factories showed that the type of response to stabilizer depended on the preheat treatment given to the milk. For example a series of samples from one factory gave results:—

TABLE I
EFFECT OF PREHEATING ON HEAT-STABILITY TEST

Preheat treatment	Coagulation Time (min.)		
	Control	0.25 ml	0.5 ml
192°F for 20 min.	24	18	21
192°F for 12 min.	15	21	18
182°F for 30 min.	12	21	24
174°F for 30 min.	9	15	21

quot was a control and to the others were added 0.25 and 0.5 ml of a solution of disodium phosphate of strength designed to equal 50% and 100% of the maximum stabilizer used in practice. The tightly capped bottles were preheated for 5 min-

It will be seen that the more severe the heat treatment the longer was the coagulation time for the control with this particular milk. The shape of the curve was between type B and D for the highest heat sample, response to stabilizer being

not great. As the heat treatment decreased the control reading also decreased and the response to disodium phosphate increase.

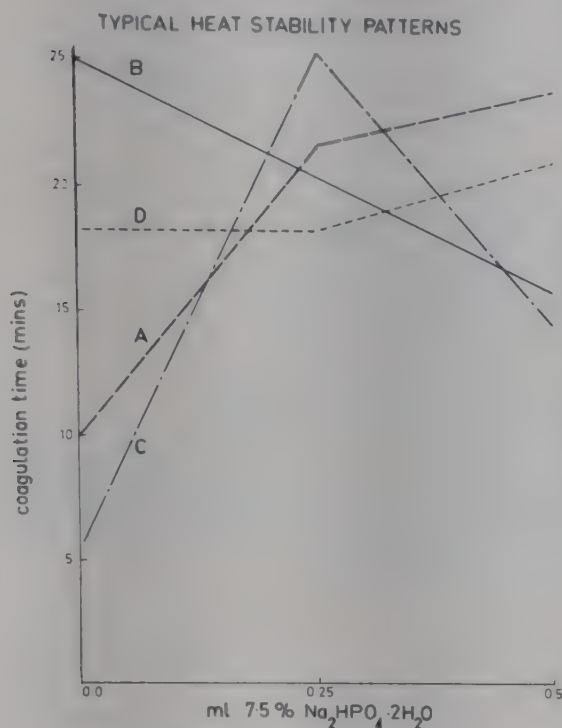


FIG. I

Collaboration with the Manila factory showed that best results were usually obtained with powders of type B or D although powders of type A were acceptable provided the coagulation time for the control was 15 minutes or more and the response to stabilizer was positive but not too dramatic. Using such criteria it has been possible to arrange for a regular supply of satisfactory powder to the Manila plant in collaboration with the factories concerned.

FACTORS INVOLVED IN HEAT STABILITY VARIATION

There were noticeable variations with season and factory in the ease of obtaining suitable heat stability. A possible factor checked in the early stage was variation in the lactose-protein ratio. Lactose percentages in skim milk powder vary less than protein percentages and, in view of the logarithmic effect of concentration above, this may have

been significant. However comparison of powders with ratios of 1.41 (34.0% protein/48.1% lactose) and 1.26 (38.1% protein/47.9% lactose) — about the extremes of the normal range in Australia — showed no obvious differences from this cause. The addition of soluble calcium or its removal with ethylenediamine-tetra-acetate (E.D.T.A.) tended to change the shape of the heat stability curves. However the results suggested that the minor pH changes caused by these additions could have been more significant than the changing calcium concentrations.

Figure II shows a typical result of an experiment in which the pH of the powder dispersions was altered by additions of either acid or alkali or by using mono- or di-sodium phosphate.

EFFECT OF pH ON HEAT STABILITY
RECONSTITUTED SKIM MILK POWDER

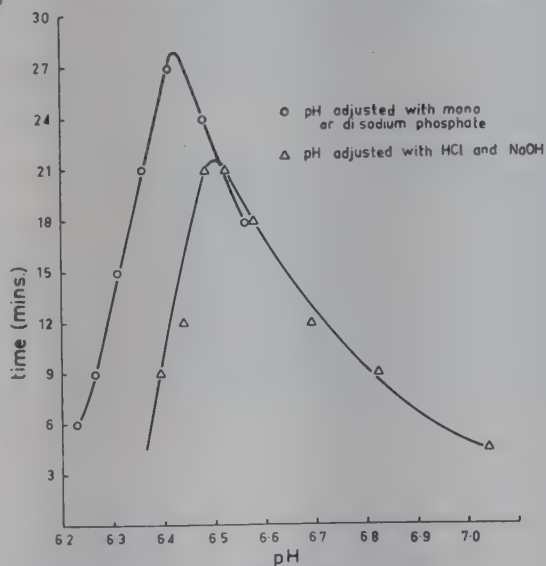
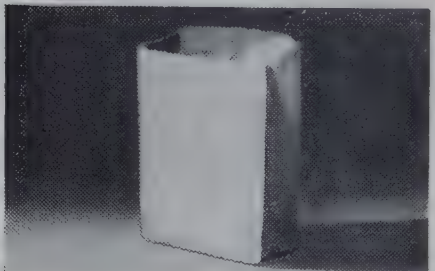
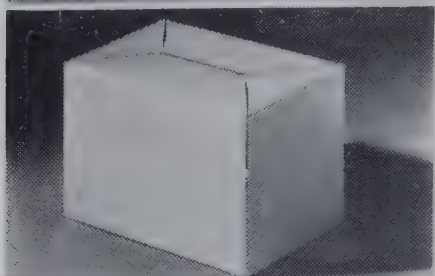
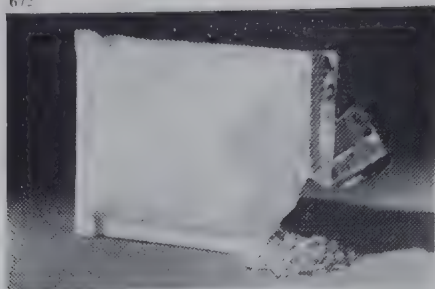


FIG. II

The trend illustrated is for each powder to exhibit a pH of maximum heat stability in a very narrow pH range. When the pH is adjusted with phosphate the sequestering effect on calcium tends to give higher stability at the maximum and shifts the pH of maximum stability to the acid side. The effect of adding calcium is the reverse.

The natural pH of the powder can vary seasonally as can the pH of



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maximum heat stability. The effect of preheating is to reduce both these pH values but not necessarily to the same degree.

These results correspond well with those of Rose (1963) in Canada on fluid concentrated milk using a somewhat different heat stability method. Rose postulates the effect of pH as being to influence the formation and stability of the complex which is formed between *k*-casein and β -lactoglobulin on heating. The evidence now becoming available from various sources suggests that the problem is rather complex.

Rose (1964) showed that most cows produced consistently milks of either type (I) which showed both a maximum and a minimum in its pH-heat stability curve or a type (II) which showed only gradually increasing stability as the pH increased. Addition of *k*-casein to type I changed the shape of the curve to that of type II. Addition of β -lactoglobulin to type II milks changed the shape of the curve to type I. Rose postulated that his findings suggest an influence of concentrations of *k*-casein at micellar surfaces.

Recent work by Feagan and Griffin in Victoria (personal communication) gives evidence that sub-clinical mastitis is a factor in such variability and may explain some of Dyson Rose's observations.

Further complicating the picture is the recent discovery by several workers that *k*-casein and β -lactoglobulin occur as genetic variants. Schmidt, D. G. and Koops, J. of the Netherlands Institute for Dairy Research (in press) have shown that milks in which *k*-casein is present as the A genetic variant have a pH of maximum stability about 0.10 unit (6.50) higher than those in which the B form of *k*-casein is present. The genetic variation of β -lactoglobulin did not alter the pH of maximum heat stability.

The studies in various parts of the world should soon increase our knowledge of the basic factors involved in stabilizing milk to heat. In the meantime the evidence on the effect of pH and phosphate addition allows for a more informed approach to the problem of supplying a suitable skim milk powder for recombined evaporated milk. It is now normal in collaborative work with spray drying factories to study the pH-heat stability curve obtained using mono- and di-sodium phosphates. A similar approach is being taken in manufacture of evaporated milk as the amount and type of stabilizer can affect such qualities as the colour and viscosity of the product.

— To be continued

STANDARDS

A.S.A. ISSUES NEW AMERICAN STANDARD ON TEMPERATURE MEASUREMENT THERMOCOUPLES

The American Standards Association has issued a new standard, titled "*Temperature Measurement Thermocouples, C96.1-1964*". (\$4.50.)

Sponsored by the Instrument Society of America, the new standard is based on the original work of I.S.A. Recommended Practices Committee (8D-RP1) on Thermocouples and Thermocouple Extension Wires.

Thermocouples for temperature measurement account for about 22 per cent of instrument manufacturing activity of temperature-sensing devices and have wide use throughout the scientific, research, and industrial world.

In addition to definitions of terminology, the new standard includes coding practices, temperature-E.M.F. tables, and procedures for fabrication, selection, checking, and installation for six widely-used types of thermocouples.



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UNIFORMITY OF FOOD REGULATIONS

By R. FISHER,
Technical Secretary, C.A.F.T.A.

The mechanism involved in achieving uniformity in State food regulations is complex. Here is a clear exposition on those mechanisms by an acknowledged expert in the field. It should be required reading for all of those who would play at this particular game of "drafts".
— Acting Ed.

The promulgation of Food Regulations is a sovereign right of the State Governments and is delegated by each Government to its Health Department. The mechanism in five of the six States makes use of a Food Advisory Committee (called the Food Standards Committee in Victoria) which has been set up as prescribed in the State Pure Food Act or Health Act. This Food Advisory Committee advises the Health Minister that such and such a regulation or amendment is desirable. The Minister may either accept or reject the advice. In the sixth State, Queensland, the Director General of Health and the Chief Food Inspector advise their Minister direct. If the advice is accepted the regulation or amendment goes to the legal draftsman of the Department and is eventually gazetted, and if not objected to by Parliament, becomes law.

All Health Departments have signified their acceptance of the ideal of having, where possible, regulations uniform in intent and requirements in all States. Sometimes, due to the effect of other Acts, this aim cannot be realised.

THE COMMITTEES

In an attempt to obtain uniform regulations in all States the Com-

monwealth Government takes a coordinating role through the Commonwealth Health Department. This Department works through its National Health and Medical Research Council (the N.H.M.R.C.) and its various committees.

The members of the N.H.M.R.C. consist of the Directors-General of Health or their counterparts, of each State, the Commonwealth, and of the Territory of Papua and New Guinea; three representatives of the Commonwealth Department of Health; a representative of the Serum Laboratories; 10 representatives of various medical Associations or Colleges; an eminent layman and an eminent laywoman.

Of the various advisory committees and committees of the council, three are of particular interest to us: The Public Health Advisory Committee, or P.H.C.; The Food Additive Committee or F.A.C.; and the Food Standards Committee or F.S.C., not to be confused with the Victorian Food Standards Committee. Members of committees are appointed by Council and as members do not represent any organisation.

An address to The Process Milk Manufacturers' Association of Australia Ltd., in Melbourne, May, 1965.



These manufacturers have one thing in common ... they all use Darex sealing compound

Sealing compound is a vitally important component of cans. It gives protection against leakage caused by damage to the seams. It guards against the entry of bacteria through weaknesses in the double seams. Small wonder that the "big names" in the Australian canning industry use Darex sealing compound exclusively. They go by results, and they have proved that Darex gives the best results — every time.

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Photomicrograph of the double seam of a can at the lap showing the seam structure. This is a critical area for can sealing.

The Public Health Advisory Committee consists of the Directors General of Health of the various States and Territories, the Professor in charge of the School of Public Health, and his deputy.

The Food Additives Committee consists of experts in the field of food additives. Two are from the Commonwealth Health Department, two from State Health Departments, one from C.S.I.R.O., four from University staffs and three from industry.

The Food Standards Committee is of particular interest to us, as are the details of its membership. The Chairman is Professor F. H. Reuter of The University of N.S.W., the Deputy Chairman is Dr. D. B. Travers of the Commonwealth Health Department and the Secretary is Mr. J. P. Warry also of the Commonwealth Health Department. Other members are:—

Mr. W. R. Jewell of the Victorian Health Department.

Mr. J. F. Kefford of C.S.I.R.O. Division of Food Preservation.

Mr. W. H. Kelly, Chief Food Inspector of Qld.

Mr. D. Kruger, Chief Food Inspector of A.C.T.

Mr. R. C. McCarthy, Chief Food Inspector of S.A.

Mr. W. Madgwick, Chief Food Inspector of N.S.W.

Mr. E. S. Ogg, Government Analyst of N.S.W.

Mr. I. H. Smith and Mr. L. N. Thornton, both of the Department of Primary Industry.

Dr. V. M. Lewis and Mr. J. G. Kringsman, both of whom are employed in Industry.

In its operations the Food Standards Committee makes use of services offered by the Council of Australian Food Technology Associations, more briefly called C.A.F.T.A., its component Associations and committees which are the Food Technology Associations (or F.T.A's) of each State, the F.T.A's

Technical Committees and C.A.F.T.A's Technical Standing Committee or T.S.C.

The Food Technology Associations are divisions of the Chambers of Manufactures and are comprised of food manufacturing companies, including ancillary industries, the only pre-requisite for membership being membership of the Chamber.

Since *C.A.F.T.A's Technical Standing Committee* plays a major role, at Industry level, in the move for uniformity of regulations, its membership is of interest.

Mr. N. W. Rodd, Research and Development Manager of Unilever Aust. Pty. Ltd., is Chairman.

Mr. R. Fisher, Public Analyst, is Secretary.

The other permanent members are:—

Dr. R. A. Edwards, presently Acting Head of the Department of Food Technology, The University of N.S.W.

Dr. V. M. Lewis, a Director of Master Foods Pty. Ltd.

Mr. D. W. Grover, formerly head of the Food School, East Sydney Technical College, and now of M.B.T. Research Laboratories.

Mr. W. W. Hopkins, Chief Chemist and Director of Henry Jones & Co. (Sydney) Pty. Ltd.

Mr. P. Lever-Naylor, Production Division Manager of the Nestle Co. (Aust.) Ltd.

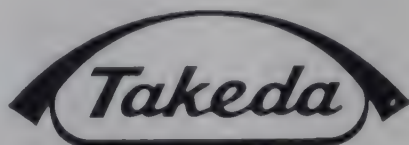
Mr. F. J. H. Ottaway, Chief Chemist of William Arnott Pty. Ltd.

From time to time, for particular meetings, others are co-opted to the Committee.

THE BIRTH OF AMENDMENTS

A new regulation or an amendment may be born in a number of ways, either (a) from within the C.A.F.T.A. framework or (b) from without.

From within the C.A.F.T.A. framework either the executive of C.A.F.T.A. may direct the T.S.C.



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(Technical Standing Committee) to prepare, for the sake of uniformity, a draft regulation for a food, the existing regulations for which differ from State to State. Alternatively a member company of a Food Technology Association, may request the Association to initiate a regulation or amendment covering certain points. The Technical Subcommittee of the F.T.A. decides if the request is reasonable, prepares an initial draft and forwards it to the T.S.C. which reviews it, and either accepts it for further processing, or requests permission from the originating F.T.A. to make certain changes.

Regulations or amendments commencing outside the C.A.F.T.A. organization may do so in one of three ways.

(i) A Health Department itself may desire an amendment or a new regulation. Instead of immediately introducing it, the Department, for the sake of uniformity, submits it to the Food Standards Committee, whose first move is usually to refer it to C.A.F.T.A. for comment by a cross-section of industry. It goes to the T.S.C. for processing.

(ii) An Industry Association may submit a draft regulation or amendment to the Food Standards Committee which the F.S.C. may consider worthy of consideration. The drafting of a regulation is a skilled art and detailed knowledge of the regulations as a whole and a knowledge of the parent Acts is required. To-date all such submissions received by the F.S.C. have not been in a form suitable for detailed consideration by that Committee, and have been referred to C.A.F.T.A. for re-drafting. This is done by the T.S.C.

(iii) The F.S.C. itself may consider that such and such a regulation is necessary. It requests C.A.F.T.A. to draft such a regulation incorporating this and that point and these and those provisions. This is done by the T.S.C.

THE PROCESSING OF DRAFTS

We now come to the T.S.C. processing of drafts.

Having prepared a draft the T.S.C. sends copies of it, together with background information and a questionnaire to each of the Food Technology Associations for circulation to each of their member companies and to any other company or Industry Association that the F.T.A. Secretary may consider interested. A time limit is imposed for receipt of comments.

Comments by members, etc., are correlated by the Technical Subcommittees of the F.T.A.'s, commented upon and forwarded to the T.S.C.

The T.S.C. considers all of the comments received. Those considered of sufficient merit are incorporated into a second or *B* draft. Those comments not so used, and which are not nullified by an overriding act or regulation, are incorporated in the background information, and questions concerning them are included in the questionnaire.

This *B* draft is sent to F.T.A.'s for issue to those members, etc., who evidenced an interest in the *A* draft.

The cycle is repeated until each clause is agreed to by five out of the six F.T.A.'s. This has taken up to 5 drafts.

The draft so agreed to, together with background comments giving the reasons for the various clauses, requirements, etc., is forwarded to the Commonwealth Health Department. The background comments include minority viewpoints as well as those of the majority.

If the draft permits the use of any additive it is first sent to the Food Additives Committee for advice as to whether or not the additive should be permitted. At this stage the F.A.C. may call for further evidence justifying the use of the additive.

When passed by the F.A.C., or if the draft does not refer to an addi-



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tive, the Commonwealth Health Department sends copies to State Government Analysts for comments. When these are available the draft receives its first consideration by the F.S.C. in conjunction with the Analysts comment. If the F.S.C. make any significant change, C.A.F.T.A. is asked to obtain comments on the change. The T.S.C. prepares a list of such changes to all drafts considered at a F.S.C. Meeting and submits them to F.T.A.'s for forwarding to members, etc., as previously outlined. On receipt of comments the T.S.C. prepares a submission either accepting the change, or offering evidence against the change, or proposing a compromise.

This submission is considered at a subsequent meeting of the F.S.C. If further changes are made the process is repeated until a compromise draft is obtained.

The compromise draft is then sent to the Food Advisory Committees of each State for comment. These comments are considered at a later F.S.C. Meeting. If any of the comments call for significant changes they are referred to C.A.F.T.A. as previously, otherwise minor changes are made and the draft sent to the Public Health Advisory Committee.

The P.H.C. may reject the draft as a whole, it may return it to the F.S.C. objecting to a portion, in which case the F.S.C. refers it back to C.A.F.T.A. for re-drafting, or the P.H.C. may accept it and send it to State Health Departments with a recommendation that it be introduced into State Regulations.

On receipt by the State Health Departments it is considered by the Pure Food Advisory Committees who either accept it or reject it. If accepted it is gazetted, and, if not objected to in Parliament, becomes law.

I am tempted to end on the facetious note that any resemblance of the lawful regulation to the original

draft is purely coincidental. However, about forty drafts have been completed in the above fashion, and in all of these a reasonable degree of compromise has been obtained.

B.I.B.R.A.

The British Industrial Biological Research Association (B.I.B.R.A.) new laboratories at Carshalton, Surrey, have now been occupied. They have cost over £300,000. The building stands in 16½ acres of land, adjoining the British Medical Research Council's site, on which there are units concerned with toxicology, laboratory animals, virology and neuropsychiatry. B.I.B.R.A.'s laboratories provide facilities for pathology, biochemistry, toxicology, organic synthesis, analytical chemistry and for radio-active-isotope work. An operating theatre and post-mortem room are also provided.

The Association is ready and equipped to carry out experimental work on the lines of existing techniques for detecting and measuring toxic action as well as studies of the metabolism of compounds in man and animals. An active programme of research is under way to develop the more delicate methods of testing which are so urgently required in the field of safety evaluation.

HUMAN BOTULISM

A total of 46 cases of botulism were reported in 1963. Twenty-four of the cases were caused by commercial processed foods: canned tuna, smoked whitefish, smoked whitefish chubs, and liver paste. This represented the largest number of cases of botulism since 1939, and the largest number from commercially processed food since 1921. While botulism has been reported in the United States since before 1899, few detailed studies of the physiological action of the botulinus toxin have been reported. A recent report of the physiological evaluation of two men suffering from human botulism is summarized here.

"Nutrition Revs.", 22, 159, 1964.



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SECOND INTERNATIONAL CONGRESS OF FOOD SCIENCE AND TECHNOLOGY

WARSAW, POLAND: 22nd – 27th AUGUST, 1966

The Second International Congress of Food Science and Technology will be held in Warsaw during the week beginning Monday, 22nd August, 1966.

The First Congress was held in London in September, 1962. The invitation to hold the Second Congress in Poland was extended on behalf of the food scientists and food technologists of Poland represented by the Polish Ministry of Food Industries, the Committee of Food Technology and Chemistry of the Polish Academy of Sciences, and the Association of Polish Food Technologists and Technicians.

The Polish Organization Committee will be glad to welcome in Warsaw all who are interested in Food Science and Technology.

A comprehensive scientific programme has been prepared to cover a wide variety of topics of current interest to food scientists and technologists.

The Plenary Sessions will be addressed by outstanding scientists. In addition Sessions will be devoted to the discussion of reports presented by the Subcommittees of the International Committee on the following themes:—

- the formation of an International Union of the national scientific and technical societies dealing with food science and technology.
- international food science abstracts.
- higher education and training in food science and technology.
- Congress III.

SCIENTIFIC PROGRAMME

Eight general topics will be discussed. Each topic will be introduced by invited papers presented by active workers in the subject and selected so as to emphasize fundamental aspects of food science and technology. The eight topics divided into subtopics will comprise about twenty technical sessions as follows:—

A: Novel Protein Foods and their Protein Sources

1. Plant Proteins and their Utilization.
2. Sea Foods as Protein Sources.
3. Micro-organisms as Protein Sources.

B: Chemical and Biological Deteriorative Changes in Food

1. Changes involving Flavour and Texture.
2. Changes involving Colour.
3. Changes brought about by Micro-organisms.

C. Technological Advances in Food Processing

1. Advances in Heat Processing, especially High Temperature-Short Time.
2. New Preservation Methods with emphasis on Irradiation.
3. New Developments in Dehydration, especially in Freeze-Drying.

D: Advances in Food Engineering

1. Engineering Analysis of New Processes in Food Technology.
2. Engineering Analysis of Equipment Performance in Food Technology.
3. Physical Properties of Food Materials and their Significance in Equipment Design.

E: Technical Problems of Safety and Purity of Foods

1. Food and Feed Additives.
2. Agricultural Chemical Residues in Food.
3. Food-borne Infections and Intoxications.

F: Advances in Methods for Assessment of Food Quality

1. Methods for the Assay of Colour, Texture, Consistency and Flavour of Food.

2. Sensory Evaluation and Correlation between Instrumental and Sensory Techniques.

3. Methods for the Determination of Food Contaminants.

G: Economic, Sociological and Nutritional Aspects of Food Production, Processing and Consumption

1. Food Industries in Relation to Agricultural Policy and Planning.

2. Food Industries in Relation to Nutritional Needs and Local Food Habits.

3. Food Industries in Relation to the Catering Industry.

H: Special Problems of Food Science and Technology

1. Modern Trends in Education and Training.

2. Abstracts and Documentation.

3. Food Laws and Regulations.

FREELY CONTRIBUTED PAPERS

Members of the Congress are invited to submit papers for presentation. Such papers shall be limited to material not previously published.

Titles and abstracts in English (up to 400 words) must be in the hands of the Congress Secretariat on or before November 1st, 1965. Papers will not be accepted after this deadline.

The abstracts will be printed and distributed to participants with other Congress material. Authors of the contributed papers will be free to publish their manuscripts in journals of their own choice any time after the Congress.

OFFICIAL LANGUAGES

The official languages of the Congress will be English, French, German and Russian. Simultaneous translations in English-Russian will be provided for the Plenary Sessions. The printed material disseminated by the Polish Organizing Committee will be in English.

EXHIBITS

The main hall of the Technological University of Warsaw will be used to display exhibits illustrating advances in the Polish food industries. An exhibition of books and publications dealing with food

science and technology will provide a broad survey of the specialized literature on an international basis.

PROCEEDINGS

The Proceedings of the Congress will be published and will consist of the papers, reports and official decisions of the Congress presented at the Plenary Sessions, and the introductory papers at the Subject Sessions.

VISITS

Arrangements will be made for participants in the Congress to visit scientific institutions and industrial plants in the Warsaw area. The staffs of the respective centres will hold *open house* on the day chosen for the visits.

LADIES' PROGRAMME

A special ladies' programme will be prepared. This will include visits to cultural, educational and social centres and to places of historic interest. Free time will be provided for personal sight-seeing and for shopping.

RECEPTIONS

An official banquet is to be arranged for participants in the Congress. There will also be a reception by the President of the Congress for leading scientists from different countries.

POST-CONGRESS EXCURSIONS

Arrangements will be made for four 4-5 day excursions to places of historical and tourist interest. The excursions will be made by coach and in groups of 30 persons. Each group will have its own ORBIS guide speaking at least one of the four official languages.

COSTS

The total costs of the stay in Poland will include (for one person):—

(a) Registration fee — U.S. \$20.00.

— Continued on page 589

POLYPHOSPHATES AND CORROSION OF TINPLATE CANS

The Pure Food Acts in Australia were recently amended to permit the addition of phosphates to canned meats in amounts up to the equivalent of 0.3 per cent P_2O_5 . Polyphosphates increase the water-holding capacity of meats and so improve yield, and their use also reduces fat separation and improves texture of the meats.

In "Food Preservation Quarterly" (24, 65, 1964), a warning is being given that canners should be cautious in using phosphates in canned meats since severe staining and corrosion of the tinplate may result and the meat may become discoloured where it is in contact with the can. Substantial losses attributable to the use of phosphates in canned ham and meat loaf products have occurred in this country and overseas. A survey of 18 Danish factories undertaken by the Danish Meat Research Institute showed that 15 had had problems with corrosion in pork luncheon meat — nine with corrosion in mixed luncheon meat, and six with canned hams. An investigation, as yet incomplete, by the Danish Meat Research Institute has shown that phosphates accelerate the corrosion of cans and increase the risk of staining the tinplate and the product (J. E. Pedersen, "The Influence of polyphosphates on the corrosion of tinplate cans". Comité International Permanent de la Conserve, Madrid. May, 1964.)

Fully lacquered cans fitted with aluminium anodes have been developed for phosphate-cured meats, such as hams, which are stored under refrigeration. These cans are widely used in Australia and effectively control staining and corrosion,

which caused heavy losses when phosphate cures were first used.

Several lots of meat-loaf-type products showing severe staining and corrosion have recently been examined in the laboratories of the C.S.I.R.O. Division of Food Preservation. In extreme cases the cans were almost completely detinned and the discoloured surfaces of the product contained heavy concentrations of brown and black compounds of both tin and iron. Frequently the cans were swelled by hydrogen produced by the processes of corrosion. An investigation of the effect of phosphates on the storage life of canned meats has since been commenced in these laboratories.

SECOND INTERNATIONAL CONGRESS OF FOOD SCIENCE AND TECHNOLOGY

(Continued from page 588)

(b) Hotel accommodation — from 5.50 to 12.50 U.S. \$ per day.

(c) Banquet and Cultural Events — 10.00 U.S. \$.

(d) Post-Congress excursions (optional) — from 51.50 to 68.00 U.S. \$ per excursion.

(e) Ladies' Programme (optional) — approx. U.S. \$18.00.

All fees are to be paid in Poland to ORBIS officers at the registration desk.

Climate: The climate in late August is moderate. The average temperature is $+17.5^{\circ}\text{C}$ (63.5°F), and the average relative humidity is 75 per cent. August is rather a sunny month, but the possibility of having a few rainy days should be taken into account.

SUMMERLAND EXPERIMENT STATION'S 50th ANNIVERSARY

The Canada Department of Agriculture Research Station at Summerland, British Columbia, recently completed 50 years of service that have resulted in notable benefits to the fruit industry of British Columbia and in research achievements that have gained world recognition.

Research on tree fruits has been a particularly important field of work. Many commercial varieties have been introduced as the result of extensive testing at the Station or produced from selections made at the Station. Commercial practices for harvesting, handling and storage of fruit in British Columbia are based on recommendations from the Station's fruit storage research programme. Controlled atmosphere storage has been shown to be successful for McIntosh, Newton, Spartan and Delicious apples and Bartlett pears with the specific carbon dioxide, oxygen and temperature requirements determined by the variety. Current research on tree fruits includes: breeding for varieties having fruit of improved shape, colour, flavour, texture, harvesting and storage characteristics; studies on the effect of climatic factors on fruit quality; and fundamental and applied studies on harvesting and storage conditions that affect the quality and keeping properties of fruit.

The fruit and vegetable processing laboratory was established in 1929. Since that time it has made many contributions to increase the utilization of fruits and vegetables. The following are some of the products and items that have been studied and utilized commercially or for which there appear to be good commercial prospects: sweet cherries preserved with sulphur dioxide, candied fruit, clear and opalescent

apple juice, vitamin C-fortified apple juice, tomato juice, juice storage, juice blends, dehydrated apples, canned fruit pie fillings, frozen vegetables, small cannery equipment, lye peeling of peaches, vacuum equipment, fruit syrups, zucca melon, jam formulae, mead. Work in progress includes projects to determine the flavour components of apple juice and cider in relation to quality, to improve methods of candying fruit and fruit confections, to develop high quality wine and cider from Okanagan fruits, new frozen vegetable products, fruit juice concentrates, fruit purees, dietetic jams, pickles and sauces, and to study technical problems in canning, freezing and dehydrating of fruits and vegetables.

Other work at the Station has shown that tree fruit quality is influenced greatly by the nitrogen status of the tree which, in turn, depends on a variety of fertilizer and management practices. With regard to diseases, an increasing prevalence of fruit rots requires the development of new chemical treatments and continuous adjustment of cultural, harvesting and storage practices to reduce their severity. Investigations are being conducted to learn the means by which fungi invade fruit tissues. Studies on fruit handling in orchards and in packing houses showed that almost half the damage to fruit in harvesting occurred in the orchard, and improved procedures and equipment are being designed for handling various tree fruits.

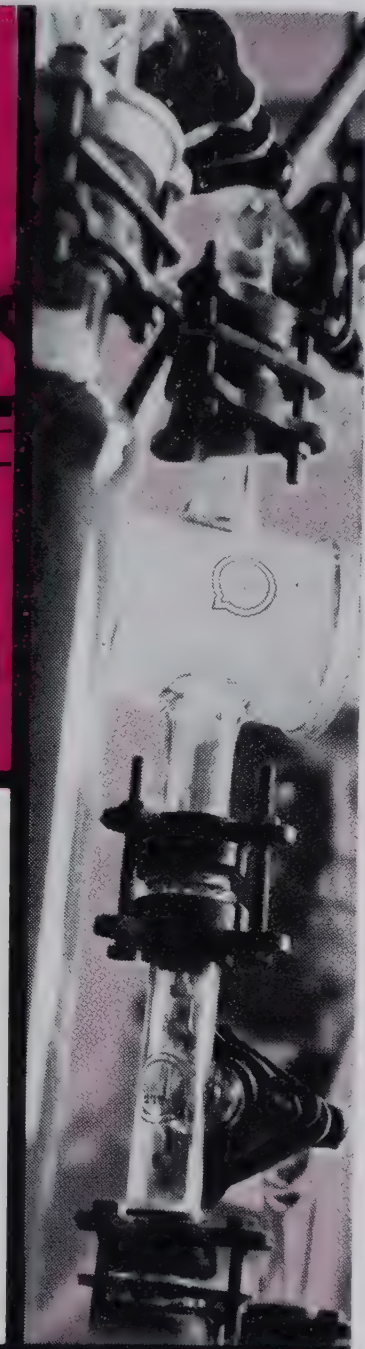
What we see depends mainly on what we look for.

— Sir John Lubbock



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Jacketed Storages for Fruits and Vegetables

Since the design and use of jacketed storages for fruits and vegetables was described^{(1),(2)} the value of this type of storage for apples has been receiving increasing recognition. The number of such commercial storage rooms in Canada has grown from a single one in 1961 to about ten at present and further growth is expected. Decisions are made by operators to use this type of storage principally for improved quality retention in the stored product and for increased life in the storage building itself.

Quality retention is improved through greater conservation of the original moisture of the freshly harvested fruit. In principle, the jacketed chamber resembles the crisping compartment of a household refrigerator, it keeps the product cool but isolates it from the dehydrating effects of the refrigeration cooling coil. The isolation is achieved by providing an air space which completely surrounds the storage room. Refrigerated air in this space forms a cold envelope or jacket that surrounds the produce but is isolated from it by a moisture-vapour-proof wall. In this manner, moisture losses can be reduced to 50 per cent of those that occur in other well-designed commercial storages. The anticipated weight losses in most refrigerated storages range from 0.5 to 1.0 per cent per month. Apples in jacketed storages have shown average net losses of 0.08 to 0.21 per cent per month. (This does not include losses by transfer of moisture from apples to wooden containers which could be avoided by using water-saturated on non-absorbent boxes.) In addition, storage disorders, including rots, core browning, scald and breakdown were not increased by the higher relative humidity within the jacketed storage.

It is too early to assess the value of this principle in extending the life of the storage structure itself.

However to the present date experience indicates that there is little likelihood of deterioration due to moist conditions in the building. This type of structure is more costly to build than the conventional storage, but there may be ways of reducing the cost without losing the advantages of the system. Nevertheless, the increasing use of jacketed storages indicates that some commercial operators in Canada consider the greater initial costs are justified for apples. Further attention to these storages may show them to be equally advantageous for a number of other products.

REFERENCES

- (1) Lentz, C. P. and E. A. Rooke. "Food Technol.", 11, 257-259, 1957.
- (2) Phillips, W. R., Lentz, C. P., Rooke, E. A., and W. M. Rutherford. "Can. Refrig. Air Conditioning", 27 (12), 20-23, 1961.

NEW PACKAGING MATERIAL

American Cyanamid Co.'s new *XT Polymer* bottle was displayed for the first time at the recently held American Management Association's annual National Packaging Conference and Exposition in Chicago, U.S.A.

The new plastic is tough, transparent, and available in a wide variety of tints. It can be injection and extrusion blow-moulded into rigid bottles for food, pharmaceuticals and cosmetics. It can also be vacuum and pressure formed into tubs, trays and blister packs. It does not have the processing limitations of rigid PVC.

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Council of Australian Food Technology Associations Incorporated

1965 CONFERENCE

Minutes of the Fourteenth Conference,
held at Terrigal, N.S.W., May 24-26, 1965

Reports submitted to the Conference
will be published as Appendices in the
November issue of this Journal.

PRESENT:

C.A.F.T.A., Inc.: N. M. Gow, President;
R. E. Casey, Treasurer; A. Downing,
Secretary.

Queensland: D. I. Shew, P. Seale.

New South Wales: Dr. V. M. Lewis,
M. E. Jones, Dr. R. A. Edwards.

Victoria: J. M. Kinsey, G. G. Blackstock,
J. D. Bartley.

Western Australia: A. M. Vernon, G. E.
Rock, C. I. Williams.

South Australia: G. F. Gregerson, A. F. H.
Dawson, J. V. Harvey.

Tasmania: G. F. Allison, E. G. Bessell.

Committee Representatives:

N.H. & M.R.C. Food Standards Committee:
Dr. V. M. Lewis, J. G. Krigsman.

N.H. & M.R.C. Food Additives Committee:
Dr. R. A. Bottomley, Dr. K. T. H.
Farrer.

C.A.F.T.A. Technical Standing Committee:
N. W. Rodd, R. Fisher.

Journal "Food Technology in Australia":
Professor F. H. Reuter, Editor; S. M.
Adams, Manager; F. S. Bradhurst, Chair-
man.

Apologies: H. G. Jessep, G. E. Robson, G. E.
Nettelbeck.

OPENING

The Chairman officially declared
the 14th C.A.F.T.A. Conference open
and welcomed all Delegates and
Committee representatives to the
Conference.

He then proposed a programme
for the Business Sessions of the
Conference which was adopted.

PRESIDENT'S REPORT

The President presented a com-
prehensive report (Appendix A) on
the activities of C.A.F.T.A. and the
Executive since the 1963 Confer-
ence.

On the motion of Mr. Gow, sec-
onded by Mr. Seale, the report was
adopted.

F.S.C. REPORT

The report covering the activities
of the Food Standards Committee
(Appendix B) for the past two
years was presented by Mr. Krigs-
man on behalf of Dr. Lewis and
himself.

Considerable discussion arose
concerning the proposed declara-
tion of food additives on food labels.

The Conference considered that
the detailed declaration of food ad-
ditives on labels was unnecessarily
restrictive to industry and such
action should be minimized.

It was agreed that it may be
necessary for C.A.F.T.A. to express
its views on this matter in the near
future but meanwhile the Commit-
tee's nominees should make known
C.A.F.T.A.'s feelings on this matter.

Professor Reuter advised the Con-
ference that all Committee represen-

tatives are now appointed by the National Health and Medical Research Council and therefore the so-called C.A.F.T.A. representatives are now invitees to these Committees and the N.H. and M.R.C. Constitution states that all Committee Chairman and members (except co-opted members), must be appointed by the Council. The Council also insists that details of its discussions remain confidential at all levels until approval is given for the release of printed reports.

It was agreed that the latter fact is a very serious handicap to the workings of the F.S.C. and the food industry via C.A.F.T.A. but it was decided that no action be taken at this stage.

Discussion then arose on the second paragraph of Item 4 of the F.S.C. Report regarding the Public Health Committee's decision to block consideration by the F.S.C. of a proposed standard, until the opinion of State Health authorities was ascertained as to the need for such a standard.

The F.S.C. is opposed to this procedure and the C.A.F.T.A. nominees undertook to make known C.A.F.T.A's objections to this procedure.

The F.S.C. nominees requested that comments on drafts come from responsible officers of individual companies. For explanation they advised that in some cases Company Management is not made aware of draft regulations until the draft reaches its final stages. They then wish to make comment, thus holding back the progress of the recommended draft.

On the motion of Dr. Lewis, seconded by Dr. Edwards, the report was adopted.

FOOD ADDITIVES REPORT

Dr. Bottomley presented the report (Appendix C) on the activities of the Food Additives Committee on behalf of Dr. Farrer and himself.

The Report was then discussed and adopted.

The nominees stressed that members of F.T.A's should be encouraged to forward requests for new additives through C.A.F.T.A. to the F.S.C.

On the motion of Mr. Kinsey, seconded by Mr. Shew the report was adopted.

On the motion of Dr. Edwards, seconded by Dr. Lewis is was resolved:—

"That the incoming C.A.F.T.A. Executive confer with the N.H. and M.R.C. with a view to submitting a list of nominees for the F.S.C. and F.A.C. when these appointments come up for review."

TECHNICAL STANDING COMMITTEE REPORT

Mr. Rodd as Chairman of the Technical Standing Committee presented a report (Appendix D) on his Committee's activities over the past two years and expressed his deep appreciation to the members of his Committee and particularly to the Technical Secretary, Mr. Fisher.

The President then moved a vote of thanks to the Committee for the work it has done on C.A.F.T.A's behalf, which was carried by acclamation.

The Chairman of the F.S.C., Professor Reuter, in support of the President's remarks stated that due to the efforts of the T.S.C. the work of the F.S.C. was made far easier, and because of their efforts uniform regulations had been advanced to a considerable degree.

Some discussion then arose concerning the forwarding of comments by the T.S.C. to the F.S.C. and the reasons for the occasional acceptance of F.S.C. directions on certain clauses by the T.S.C.

Mr. Rodd agreed that industry should at all times be able to place its point of view before the F.S.C., but occasionally a small compromise

ise with the F.S.C. is necessary to expedite finalization of a draft. He felt that unless this was done the T.S.C. would be considered too pedantic about industry's point of view and could lose the confidence of the F.S.C. to the detriment of C.A.F.T.A.

Mr. Gregorson asked if the T.S.C. accepted comments from:—

- (a) State F.T.A's.
- (b) Industry; and
- (c) Individual opinions.

The T.S.C. assured the Conference that all received views are considered and taken into account during deliberations even if they represent only minority opinions.

Dr. Lewis suggested that in the near future C.A.F.T.A. may have to examine the constantly increasing amount of work done by the T.S.C. and its members in view of the fact that a lot of extra work was referred back to the T.S.C. from the F.S.C. Consideration may need to be given to increased Secretarial Services, and in some manner the work of the members of the Committee be facilitated by more adequate amenities.

On the motion of Dr. Edwards, seconded by Mr. Gregorson, the report was adopted.

T.S.C. be instructed to circulate to all F.T.A's, etc., Final Drafts, Submissions and Communications sent to F.S.C. and F.A.C.:

Mr. Shew stated that Queensland had raised this point since the T.S.C. submissions to the F.S.C. were not known to F.T.A's and therefore the F.S.C. comments on drafts were difficult to interpret. He felt that if this material was made available better understanding of the situation concerning draft regulations would result.

Mr. Fisher spoke in support of this view.

After some discussion, on the motion of Mr. Shew, seconded by Mr. Seale, it was resolved:—

"That the T.S.C. be asked to circulate to each State F.T.A. a copy of

the Minutes of its Meetings and also a copy of its submissions to F.S.C. and F.A.C."

FROZEN FOODS SUB-COMMITTEE REPORT

The Report (Appendix E) forwarded by the C.A.F.T.A. representatives, Mr. L. Guilfoyle and Mr. R. Pryse-Jones on this sub-committee was read to the meeting.

Considerable discussion arose on this report and Professor Reuter gave the Conference background comments on the matters leading up to the present situation regarding frozen food regulations and the code of practice for handling frozen foods. This included the latest move by the Standards Association of Australia in releasing for public comment a draft document setting out standards for retail cabinets. He considered that the draft regulations and code had by-passed uniform procedure and therefore had caused some misgivings in certain quarters.

After some discussion, on the motion of Dr. Lewis, seconded by Mr. Gregorson it was resolved:—

"That C.A.F.T.A. write to the Standards Association of Australia and inform them of the position concerning the draft regulations and the code of handling and request them not to finalise their standard for retail cabinets until this matter had been further reconciled and discussed with the Commonwealth Food Standards Committee."

On the motion of Mr. Adams, seconded by Mr. Vernon the report was adopted.

JOURNAL REPORT

Mr. Bradhurst as Chairman of the Committee of Management of the Journal gave members a report and financial statement of the Journal's activities over the past two years. (Appendix F.)

Some discussion arose as to the possibility of a change in page size

of the Journal and it was agreed that no change be made at the moment.

It was noted that during Professor Reuter's absence on Sabbatical Leave, Dr. R. A. Edwards has accepted the position of Acting Editor.

The Conference registered its sincere appreciation to the members of the Journal Committee, the Editor, and the Business Manager, for their conduct of the Journal's affairs.

On the motion of Mr. Blackstock, seconded by Mr. Jones, the report was adopted.

COMMONWEALTH FOOD SPECIFICATIONS COMMITTEE REPORT

The report (Appendix G) submitted by Mr. H. Jessep was taken as read and adopted.

Mr. Jessep was thanked for his efforts during the preceding two years.

STATE REPORTS

(Appendix H.)

The chairman suggested that these be taken as read and that State delegates may comment on the Reports if necessary.

The Reports were then discussed and adopted as follows:—

Queensland: On the motion of Mr. Shew, seconded by Mr. Seale.

New South Wales: On the motion of Dr. Lewis, seconded by Dr. Edwards.

Victoria: On the motion of Mr. Kinsey, seconded by Mr. Blackstock.

Western Australia: On the motion of Mr. Vernon, seconded by Mr. Rock.

Tasmania: On the motion of Mr. Allison, seconded by Mr. Bessell.

South Australia: On the motion of Mr. Gregorson, seconded by Mr. Dawson.

WEIGHTS AND MEASURES

Mr. Vernon, on behalf of the Western Australian sub-committee

handling this matter, presented a verbal report of developments in this field over the past two years.

The New South Wales delegates proposed a motion as follows:—

"A Standing Committee on packaging comprising State Weights and Measures Officers under the Chairmanship of a member or officer of the National Standards Commission and an agreed number of members of the food industry be set up."

Consideration was given to the whole question of Weights and Measures in the light of the comments from W.A. and N.S.W. and how C.A.F.T.A. could ensure that the views of the food industry be considered.

On the motion of Dr. Lewis, seconded by Dr. Edwards it was resolved:—

"That C.A.F.T.A. write to the Minister, Senator Gorton, along the lines of the New South Wales suggestion, requesting that food industry representatives be appointed to all committees and sub-committees set up for the purpose of regulating Weights and Measures."

When this resolution is conveyed to the Minister he should be made aware of our machinery for uniform procedure and also our experience in matters of this kind. It was also agreed to advise the Minister of the necessity for complete uniformity of labelling regulations throughout Australia.

CODEx ALIMENTARIUS COMMISSION

The Chairman reported on C.A.F.T.A.'s activities relating to the Codex Alimentarius Commission since the last Conference, stressing that the main difficulty encountered by the C.A.F.T.A. Executive had been the insufficient time available for comments on Codex documents which were most comprehensive and lengthy. He advised that under normal circumstances the Department of Primary Industry forwards Codex documents to C.A.F.T.A. immediate-

ly upon receipt but their translation and formulation in London takes so long that the time is inadequate.

The Secretary suggested that to give a little more time for State F.T.A.'s to comment, Codex documents could be copied by the Technical Secretary immediately upon receipt as he would be in a better position to expedite proceedings than the C.A.F.T.A. Executive.

It was agreed that the Department of Primary Industry be asked by the Technical Secretary to forward seven copies of the documents, if available, to allow them to be distributed to all States and the Technical Secretary.

If this number of copies is not available the Technical Secretary should examine the question of having the documents copied upon receipt, and charging C.A.F.T.A. accordingly.

C.A.F.T.A. FINANCE

The Treasurer, Mr. Casey, presented the Financial Statement covering C.A.F.T.A.'s activities over the past two years together with details of the anticipated expenditure up to the 30th June, 1965.

On the motion of Mr. Casey, seconded by Mr. Blackstock, the Financial Report was received and adopted.

During discussion on finance Mr. Gregorson suggested that a Conference be held from time to time in Canberra for the purpose of enhancing the prestige of C.A.F.T.A.

Following further discussion, on the motion of Mr. Shew, seconded by Mr. Seale, it was resolved:—

"That the Conference be held biennially for the time being, but that a meeting of the Executive Committee be held in alternate years. To these meetings we invite one of the nominees to each of F.A.C. and F.S.C., the Technical Secretary, and the Editor of the Journal."

The question of securing further interest from the food industry, especially at top management level in the affairs of C.A.F.T.A. and thus assuring strong financial support was discussed and on the motion of Mr. Bessell, seconded by Mr. Kinsey it was resolved:—

"That a sub-committee of C.A.F.T.A. be formed to find ways and means of creating more interest by top management in the food industry and that the sub-committee be formed by the F.T.A. of Victoria."

After further discussion concerning the financial possibility of staging an Annual Conference or Council meeting it was agreed that a sub-committee be formed to investigate the finance required for the operations of C.A.F.T.A. and make recommendations to the Conference.

The sub-committee comprised:—

Messrs. Casey, Jones, Kinsey, Williams.

The following report was tendered by the Finance sub-committee.

The sub-committee's recommendations were:—

"That C.A.F.T.A. be placed on a firm financial footing so that it can:—

- 1. Carry out its present functions efficiently.*

- 2. Embark on other worthwhile projects of value to the food industry. Typical examples could be:—*

- (a) Contribution to the Food Additives Research Fund.*

- (b) Sponsor the visit of lecturers to States not possessing Food Technology Training facilities.*

- (c) Give scope for Presidential interstate visits in the interests of the food industry.*

- (d) Cover the costs of full C.A.F.T.A. Executive Committee meetings and Biennial Conferences.*

(e) Provide for increases in costs which may occur over the next five years."

To achieve these objectives C.A.F.T.A. Affiliation Fees must be substantially increased.

This will necessitate an increase of C.A.F.T.A. Affiliation Fees from £4/15/0 to £7/10/0 per member company per annum.

The sub-committee unanimously agreed to recommend that Conference should take this action.

MEMBERSHIP

To assist in strengthening the financial position it is recommended by the sub-committee that a Central Membership sub-committee be formed to co-operate with each State Membership Committee to co-ordinate effort at C.A.F.T.A. level so that national companies be encouraged to become members in each State.

It is suggested that this C.A.F.T.A. Membership sub-committee be appointed by the C.A.F.T.A. Executive and that special attention be paid to the inclusion of top management representation.

Following considerable discussion on the sub-committee's report and its recommendations the following resolutions were carried. (W.A. delegates abstained from voting.)

(A) *"That Affiliation Fees to C.A.F.T.A. including Technical Service Levy and Journal Fees be raised to £7/10/0 per member per annum."*

(B) *"That reimbursement of Air Fares for delegates and invitees attending C.A.F.T.A. Conferences or Executive Council Meetings be at First Class rates."*

(C) *"That a C.A.F.T.A. Membership Committee be formed by the incoming Executive to confer with State F.T.A's to assist in increasing membership and made the activities of C.A.F.T.A. better known to top management within the industry."*

FOOD ADDITIVE RESEARCH FUND

(Appendix I.)

Considerable discussion ensued concerning the matter of financial support for this project under Professor Wright at the University of Sydney.

The F.T.A. of W.A. which had been handling this fund on C.A.F.T.A's behalf advised that as at the 30th April, 1965, there existed a credit balance of £244/2/4 and that this was the final year for which C.A.F.T.A. had promised financial support for the fund.

Several members of the Conference suggested that C.A.F.T.A. should have a look at other projects that may be worthy of our support and interest and not just continue to support the one project.

On the motion of Dr. Lewis, seconded by Mr. Jones it was resolved:—

"That the F.T.A. of W.A. be empowered to finalise this Account by forwarding the balance to Professor Wright together with a covering letter to this effect, and stressing that C.A.F.T.A. now wishes to examine and possibly support other projects of value to the food industry. It was emphasized that C.A.F.T.A. support in the initial stages of Professor Wright's project, had been of considerable assistance in bringing it to a status where it has been able to attract increased financial support."

It was agreed that the New South Wales Association form a sub-committee to seek out and examine projects that could be worthy of C.A.F.T.A's interest and support.

FOOD ADDITIVE BROCHURE

The possibility of producing a Food Additives Brochure had been examined on C.A.F.T.A's behalf by the F.T.A. of South Australia and Mr. Gregorson gave the Conference a report on the findings in this regard.

As the Conference decided that there no longer existed a need for this Brochure it was resolved:—

"That production of a Food Additives Brochure by C.A.F.T.A. be abandoned."

The Chairman thanked the F.T.A. of South Australia for their work on this project.

C.A.F.T.A. EDUCATIONAL PROGRAMME

In view of the formation of the sub-committee by the F.T.A. of Victoria to find ways and means of creating interest in the food industry no further action was taken in this matter.

C.A.F.T.A. CONSTITUTION

Mr. Gregorson on behalf of the F.T.A. of South Australia, appointed to report on this matter to the C.A.F.T.A. Conference, presented a report on progress.

As a start, South Australia had examined the Constitutions of all State F.T.A's in order to find some common basis for an up to date C.A.F.T.A. Constitution. A Conspectus of Constitutions of all State F.T.A's was made available to delegates.

After some discussion it was agreed that State F.T.A's could possibly use the Conspectus in examining their own Constitutions in an endeavour to achieving uniformity.

It was agreed that the F.T.A. of South Australia draft a new C.A.F.T.A. Constitution and forward a copy to each State for comment.

PURE FOOD REGULATIONS IN LOOSE-LEAF FORM

This matter had been raised by the F.T.A's of New South Wales and Queensland with a view to having State Health Departments print food regulations and amendments in this form for the convenience of the industry.

The Conference was advised that the New South Wales Health Department is now printing its regu-

lations and amendments in this form and is mailing amendments to regulations to members at a small cost. It was considered that all State F.T.A's should pursue this matter further with their State Health Departments.

On the motion of Mr. Williams, seconded by Dr. Lewis, it was additionally resolved:—

"That C.A.F.T.A. makes an approach to all State Health Departments seeking adoption of this method of printing food regulations and amendments for the convenience of the industry and an instigation of a mailing service similar to that existing in New South Wales."

UNIFORM PRESS RELEASES

Mr. Vernon on behalf of the F.T.A. of Western Australia advised that his Association considered that Uniform Press Releases should emanate from C.A.F.T.A. to add prestige to its activities and keep the public better informed on matters pertaining to processed food manufacture.

During discussion on this matter it was agreed that such releases could be valuable but would require editing by an experienced journalist before presentation for publication.

Professor Reuter advised that he could suggest an appropriate person and would investigate the matter when he returned from his overseas trip.

The educational functions of C.A.F.T.A. were also considered and in this direction the value of programmes for factory visits by Home Science Teachers, Home Economists and students of Teacher Training Colleges was stressed by Professor Reuter.

State Associations should consider the organization of food factory tours for these bodies and other public relation activities that would enhance the prestige of C.A.F.T.A. and the processed food industry.

DATE STAMPING OF PRE-PACKAGED FOOD

Initially, the Department of Public Health in Western Australia received a request from the Local Government Association for amendments to the appropriate Act or Regulations to provide for the compulsory branding of all pre-packed foodstuffs with (a) to date of packing and (b) an expiry date after which such foodstuffs would have to be withdrawn from sale.

Despite various arguments against the value of compulsory branding, the Local Government Association continued to press for its introduction — even though the U.K. Food Standards Committee on Food Labelling would make no recommendation when reporting on an investigation into an identical request. It is known that New South Wales (Pure Foods Act, Regulation 78 subsection 11) and Queensland's (Slaughterman's Act, 1951, sections 120-122) have legislation providing for the compulsory branding of pre-packaged meat. However we do not know whether any other State has similar legislation.

The Commissioner of Public Health did not specifically say whether he supported the Local Government Association's request or not. However he did indicate that if compulsory branding was decided upon, uniform legislation in all States would be desirable.

Mr. Vernon pointed out that the F.T.A. of Western Australia has forwarded to all State F.T.A.'s a Questionnaire, answers to which would be of assistance to Western Australia in handling this problem.

After some discussion it was agreed that State F.T.A.'s complete the Questionnaire and forward to Western Australia.

LABELLING OF IMPORTED FOODS

Concern was expressed that the proposed amendment to the Victorian regulation would require all food manufactured outside Victoria

and marketed in that State to be labelled with the name and address of the principal agent in that State.

The need for a special label for all foods marketed in Victoria would cause considerable inconvenience and added costs to interstate manufacturers, packers, etc.

It was agreed that C.A.F.T.A. should advise the Victorian Health Department of its deep concern regarding the proposed amendment and on the motion of Mr. Shew, seconded by Mr. Kinsey it was resolved:—

"That the Federal Secretary write immediately to the Victorian Health Department indicating that the Council of Australian Food Technology Associations Incorporated views with alarm the proposed labelling amendment which would require all food products introduced into Victoria to carry the name and address of the principal agent in that State."

Such an amendment would mean that manufacturers supplying food to Victoria from other States would have either to produce a special label for all food destined for Victoria, or place the name and address of the Victorian agent on all food packages. If this regulation became common to all States then all packages for interstate trade would have to carry an enormous amount of printing and in the case of a change of agent, the labels would become obsolete. The obvious aim of the amendment was to ensure responsibility for the product should it be found defective. With this objective C.A.F.T.A. entirely agrees.

Since the F.S.C. is currently considering a proposed standard for labelling, C.A.F.T.A. requests that the Department delays implementation of the amendment until the F.S.C. standard is finalised. This request is made in the interests of federal uniformity of food and drug regulations in the expectation that the labelling drafts currently with the F.S.C. will meet the situation.

In support of this submission C.A.F.T.A. requests that the Department receive a deputation from the F.T.A. of Victoria to present the C.A.F.T.A. viewpoint.

IS INDUSTRY BEING TOO TIGHTLY CONTROLLED BY REGULATIONS

This matter was raised by the F.T.A. of New South Wales as it was felt that there was a trend in this direction and a general discussion at this Conference could possibly ventilate some opinions which could be of value, not only to the food industry, but to the manufacturing industries generally.

Dr. Bottomley expressed the opinion that in many cases regulations were too tightly specified and difficulties arose that were not intended, interfering with the streamlining of regulations to the detriment of the industry.

During discussion on the matter it was agreed that regulations should be kept as simple as possible, and in order to do this, it was suggested that a set of principles be drawn up for the guidance of C.A.F.T.A. in the drafting of food regulations.

It was agreed that Mr. Krigsmann prepare a "*C.A.F.T.A. Philosophy*" for use as a guide in the drafting of regulations. Mr. Krigsmann was empowered to co-opt any assistance if he considered it necessary.

TASMANIAN MEMBERSHIP

The F.T.A. of Tasmania is concerned with the lack of interest shown by a number of its members and believes this is largely due to the policy laid down by mainland companies having controlling interests in locally based organizations.

Further, F.T.A. in Tasmania, considers that C.A.F.T.A. should approach members operating in more than one State and request them to register their opinions in each State partly to maintain local interest, but more particularly to ensure:—

(a) "*That all aspects of local food regulations are considered*" — and

(b) "*To make certain that no such interstate differences are overlooked.*"

During discussion it was suggested that perhaps Tasmania could overcome this problem by supplying a list of food manufacturers in Tasmania to the Victorian and New South Wales F.T.A's to allow these States to lobby on behalf of the F.T.A. of Tasmania. This suggestion was adopted.

It was also agreed that the newly formed C.A.F.T.A. Membership Committee could possibly assist the F.T.A. of Tasmania to gather more members.

It was also agreed that all State F.T.A's forward a full membership list to other States for correlation and information.

AUSTRALIAN CONSUMERS' ASSOCIATION

South Australia reported that they had asked that this item be included in the Agenda as they were disturbed by the activities of the Magazine "*Choice*" and its comments on certain processed foods.

Some discussion arose on this matter but no action was taken.

AUSTRALIAN FOOD MANUFACTURERS' ASSOCIATION

Some discussion arose on the activities of this body in various States, but it was agreed that the Association had been formed mainly to discuss sales tax problems and merchandising and in no way could cut across C.A.F.T.A's normal activities.

No action was taken.

C.A.F.T.A. EXECUTIVE RESPONSIBILITIES

The F.T.A. of South Australia suggested that there should be an extension of the C.A.F.T.A. Executive responsibilities and recommended the following:—

(A) That the C.A.F.T.A. Conference Minutes be written and circularised within thirty calendar days of the Conference, or earlier if practicable.

(B) That following the circularization of Minutes that all State Associations be given the specified time of thirty calendar days to question such minutes.

(C) That in the event of any question raised by State F.T.A's relating to the Minutes or an amendment being submitted that the time limit of thirty calendar days be allowed.

(D) That following the time limit for the amendment that a further thirty calendar days be given for Executive confirmation of the Conference Minutes.

This means that it is possible for a C.A.F.T.A. Executive to remain in Office and be responsible for the administration of C.A.F.T.A. affairs for a period of up to one hundred and twenty days (120) following the conclusion of a Conference.

During discussion on this matter it was agreed that there was no necessity to amend the existing situation as comprehensively as suggested by South Australia, but it was resolved:—

"That the outgoing Executive finalize the Conference Minutes and financial affairs as is the usual practice and that the incoming Executive deal with all other matters arising."

CHAIRMAN OF C.A.F.T.A. COUNCIL

The F.T.A. of South Australia put forward the proposal that the Federal President of C.A.F.T.A. at the time of commencement of the Conference be the Chairman of the Conference and remain as Chairman for the entire Conference Sessions.

The Conference agreed with this suggestion and it was also agreed that to enable this to be done the

election of Officers could follow General Business and so the Chairman remains in the Chair until the election of his successor.

F.A.C./F.S.C. JOURNAL

This matter was raised because of the problems encountered with the publication of the Minutes of a meeting of the F.A.C. in the Journal in which it listed the F.A.C. as approving additives submitted by the Wine and Brandy Producers Council of Australia. The Wine Council had submitted a wine draft to the F.S.C. who in turn had extracted the Food Additives for F.A.C. consideration. The F.A.C. had passed these additives as being safe in food and the F.S.C. had then to relate these approved additives to the Draft for Wine.

The original Draft had been referred to C.A.F.T.A., but in the meantime winemakers had considered all additives as submitted as approved and steps should be taken that there is not recurrence of any similar situation. The Conference considered that this matter had now been taken care of and therefore no further action was necessary.

SOUTH AUSTRALIAN FOOD AND DRUGS ADVISORY COMMITTEE

Mr. Gregorson reported that the F.T.A. of South Australia now has a representative on this Committee as a representative of the food industry.

Some discussion arose on such Committees in other States but no further action was taken.

The Chairman congratulated South Australia on its success in having a member of the food industry elected to this Committee.

GUARANTEES FOR RETAILERS

Mr. Kinsey reported that demands by retailers for guarantees in Victoria have been carried further in that State than intended and asked for information as to what is happening in other States in this regard.

Mr. Krigsmann advised the Conference that New South Wales dealt very efficiently with the matter of guarantees for retailers by supplying a proforma agreement throughout the State.

On the motion of Mr. Bessell, seconded by Mr. Dawson it was resolved:—

"That the incoming C.A.F.T.A. Executive direct the T.S.C. to put the New South Wales Proforma Agreement covering this matter through uniform procedure."

UNIFORM PROCEDURE

The Victorian F.T.A. raised the matter of variance in the wording of gazetted Food and Drug Regulations in various States following approval of F.S.C. Drafts by the N.H. and M.R.C.

During discussion on this matter Professor Reuter suggested that drafts should be fully checked by State F.T.A's as accidental alterations are often gazetted by State Health Departments. He recommended that State F.T.A's should check the F.S.C. reports closely and if the regulation was incorrectly gazetted the State Health Department and the T.S.C. should be advised to allow them to notify the F.S.C. and have the matter adjusted.

It was suggested that perhaps this Conference could write to the South Australian Public Health Committee registering disapproval at the fact that Sulphur Dioxide is still allowed in minced steak as this is against Australian and World Health Authorities' opinions and it is disturbing to see that the authorities in South Australia still continue to support this practice. After some discussion on the matter, South Australia asked that they be allowed to make further representations and if unsuccessful, they would again refer the matter to C.A.F.T.A.

The F.T.A. of Queensland then raised the question of consideration of comments on draft regulations by kindred bodies who wish to make comment. It was felt that the blunt refusal by C.A.F.T.A. to accept comments from these kindred bodies could prove embarrassing and be interpreted as lack of courtesy on C.A.F.T.A's part. Mr. Shew suggested that to obtain the views of all industry interested in a draft regulation it is necessary that kindred bodies be allowed to comment, but felt that the bodies forwarding the comments to C.A.F.T.A. should subsidize C.A.F.T.A's running costs to some degree as the T.S.C. did all the spade work.

After considerable discussion it was agreed that at present no change of procedure should be made.

However kindred bodies wishing to comment on draft regulations should contact the F.S.C. if they did not wish to comment within C.A.F.T.A's normal procedure.

Mr. Fisher brought to the attention of the Conference the difficulty he was having in duplicating the large number of draft regulations required under the existing uniform procedure.

This problem was discussed and it was agreed that at this stage Mr. Fisher should examine his facilities of duplication and advise C.A.F.T.A. as to the financial requirements necessary to do the job quickly and economically.

ELECTION OF OFFICERS PRESIDENT

Dr. Lewis, seconded by Mr. Bessell, nominated Mr. John Kinsey as President of C.A.F.T.A. for the period 1965/1967.

There being no other nominations, Mr. Kinsey was elected with acclamation.

Mr. Kinsey then took the Chair.

He thanked the Conference for the honour it had just bestowed

upon him stressing that he felt that C.A.F.T.A. had many responsibilities and he personally intended to continue the excellent work of his predecessors in this position since the inception of C.A.F.T.A.

VICE-PRESIDENTS

In line with the Constitution the Presidents of State F.T.A.'s were declared elected as C.A.F.T.A. Vice-Presidents.

TREASURER

On the motion of Mr. Jones, seconded by Mr. Vernon, Mr. Blackstock was elected C.A.F.T.A. Treasurer.

The following were elected to various offices as follows:—

Administrative Secretary: J. D. Bartley.

Technical Secretary: R. Fisher.

Technical Standing Committee: The existing Committee was re-elected as follows: N. W. Rodd (Chairman), R. Fisher (Secretary), Dr. R. A. Edwards, D. W. Grover, W. W. Hopkins, P. Lever-Naylor, Dr. V. M. Lewis, F. Ottaway.

Journal Committee: The existing Committee was elected as follows: F. S. Bradhurst (Chairman), A. R. Hobbs, F. S. Eagle, Professor F. H. Reuter (Editor), S. M. Adams (Business Manager).

N.H. & M.R.C. Food Standards Committee Nominees: Dr. V. M. Lewis, J. Krigsmann.

N.H. & M.R.C. Food Additives Committee Nominees: Dr. R. A. Bottomley, Dr. K. T. H. Farrer.

Commonwealth Food Specifications Committee: H. G. Jessep, W. Dickson.

S.A.A. Committee DS/2 — Chemical Analysis of Dairy Products: B. V. Heath.

N.H. & M.R.C. Frozen Food Subcommittee: L. S. Guilfoyle, R. Pryse-Jones.

Seal Holders: M. A. W. Cousins, G. M. Nettelbeck, G. F. Gregorson.

NEXT CONFERENCE

Following the adoption of the Finance Committee's recommendations and their adoption by this Conference it was agreed that an Executive Council Meeting be held in 1966 in Melbourne at a time chosen by the C.A.F.T.A. Executive.

The question of the next full Conference venue was discussed and it was agreed that Canberra be kept in mind, but that the matter be examined by the incoming Executive.

CONCLUSION

Mr. Kinsey stated that he wished to express his sincere admiration and appreciation to Mr. Gow, not only for the work his Executive had done during Mr. Gow's period of Office, but for his excellent Chairmanship of this important Conference.

He also extended these remarks to include the Treasurer, Mr. Casey, and the Secretary, Mr. Downing.

He then declared the 1965 C.A.F.T.A. Conference closed.

— To be Concluded

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BOOK REVIEWS

- "WATER AND ITS IMPURITIES", by T. R. CAMP. 355 pages. Reinhold Publishing Corp., Inc., New York; Chapman and Hall Ltd., London. 1964.

Mr. Camp in this book makes a most valuable contribution to the literature of water and waste water treatment.

The discussion attempts to co-ordinate the physical, chemical and biochemical properties of water and its impurities in terms of the total environment, and this is done in an exceedingly competent manner.

The field covered is most comprehensive, ranging from the determination of the suitability of waste water for various uses to the evaluation and design of treatment processes. As well as including a most satisfying treatment of the physical properties of pure and impure water and the composition of water and liquid wastes, it gives a comprehensive chapter on the sanitary significance of the impurities in water. The latter includes a discussion of the water-borne diseases, drinking water standards and their sanitary and toxic significance, raw water quality, standards for swimming and recreation, for shellfish, and for fish and wild life.

Mention is made of the warning sounded by Rachael Carson against the widespread use of toxic pesticides which raised recently so much controversy in the U.S.A.

A thoroughly up-to-date treatment of the problem of corrosiveness of water is included, which also deals with corrosion of all the principal metals in fresh water, and corrosion of concrete, cement mortar and asbestos-cement, all of which should be of great assistance to practising engineers.

A large portion of the book is devoted to bacterial decomposition

of organic matter in water, including the mechanism and decomposition process, decomposition of sewage solids, the biochemical oxygen demand and an evaluation of parameters by oxygen analyses. The dispersal of wastes into receiving waters is dealt with briefly but fundamentally.

Summing up, it is clear that the author has added to his already extensive world-wide reputation by the publication of this most valuable and welcome book.

Reviewer: Professor P. W. S. Ryan, School of Civil Engineering, The University of New South Wales, Sydney.

- "FOOD FOR MAN", by W. R. AYKROYD. 93 pages. Pergamon Press, Oxford; The MacMillan Co., New York. 1964. 8s. 6d.

In spite of its general title this book deals specifically with food in relation to human nutrition and the nutritional needs of human beings.

It begins with an historical chapter recounting some outstanding episodes in the development of the science of nutrition. The next chapter deals with the quantity of food needed by man and the nutritional characteristics of foods and the food consumption patterns of various peoples.

The next part of the book deals with the effects of diet on health: bad effects and good effects, with rather more about the former than the latter, especially under-nutrition and malnutrition.

The concluding chapter gives an account of various practical measures for improving health through better nutrition.

The author was for many years associated with F.A.O's Nutrition

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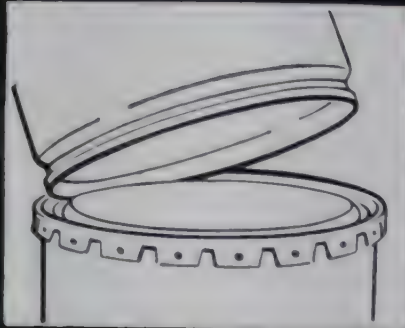
SPECIFICATIONS	100 lbs.	120 lbs.
Maximum Capacity	12.12 gals.	14.21 galls.
Maximum Volume	1.98 cu. ft.	2.31 cu. ft.
Inside Length	21½"	25½"
Overall Length	22¾"	26¾"
Inside Diameter	14"	14"
Overall Diameter	14¾"	14¾"
Approx. Wt. 22 gauge	11.8 lbs.	13.4 lbs.
Approx. Wt. 24 gauge	9.8 lbs.	11.1 lbs.
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Division and the book reflects his deep concern that insufficiency of food "cease to be a limiting factor to human happiness".

The manner of presentation is most attractive and positive, and distinctively free from circumlocution and euphemism. There are few food technologists with nutrition education in their course work: this book will help them to make up for this deficiency in a most painless manner.

Reviewer: Professor F. H. Reuter, The University of New South Wales, Sydney.



- **"THE NUTRIENTS AND THE ROUGHAGE OF CEREAL FLOURS AND THEIR IMPORTANCE FOR BREAD NUTRITION"** ("Die Nähr- und Ballaststoffe der Getreidemehle in ihrer Bedeutung für die Brotnahrung") by B. THOMAS, 256 pages. Wissenschaftliche Verlagsgesellschaft m.b.h., Stuttgart, 1964. D.M. 44.— (in German).

The appearance of books dealing with the relative merits of wholemeal and white breads provides an element of stability in a world of kaleidoscopically changing consumption patterns.

In the present book an attempt is made to survey the available literature on the subject, to examine critically some of the earlier findings in the light of new concepts and to order and classify the available knowledge.

The author, Berthold Thomas, has been associated for many years with the Abteilung Getreideforschung des Institutes für Ernährung in Potsdam-Rehbrücke and he is at present Privatdozent in the Faculty of Agriculture in the Technical University, Berlin.

Broadly speaking, the book contains two sections, one chemical and technological and one physiological in character.

First, the chemical composition of the wheat and rye grain as well as the composition of wheat and rye flours of various degrees of extraction are surveyed, then the author discusses grain quality requirements as related to extraction rate, the milling process and the effect of milling- and baking techniques on the nutritional value of bread and on bread quality. As is to be expected, the criteria of quality are those applied to German bread.

Special emphasis is placed on the biochemical changes taking place during the baking process and the way in which different extraction rates influence the various flour components, the aroma and the crumb structure of the resulting bread and its keeping quality. Then the economics of bread making processes, using high and low extraction flour are compared.

In the physiological and medical sections, the utilization of nutrients and the influence of roughage on the digestive processes are treated in some detail. Intestinal motility, consistency and volume of faeces, flatulence, etc., are discussed as well as phytic acid and mineral utilization, and dental caries. As this book deals with the effect of the roughage of cereals on organisms, coeliac disease, which is unrelated to roughage, is not mentioned.

The book further contains sections on almost every aspect of bread nutrition, ranging from the biological value of cereal proteins and nitrogen balance to the psychological, historical and geographical factors influencing bread consumption. In an interesting chapter the merits of wholemeal bread in the management of gastric disorders are evaluated.

The book, which is well produced and almost free of misprints, is easily readable in German, something that cannot be said of all German books. Every aspect of the subject discussed in this book has been treated with thoroughness. The

— Continued on page 613

Food and Cosmetics Toxicology

Editor: L. Golberg

Assistant Editor: A. J. Cohen

This outstanding journal, published for the British Industrial Biological Research Association, will be of great value and interest to those scientists who need to be fully informed of the current trends in food and cosmetics toxicology. The subject is discussed under the following headings:

RESEARCH SECTION: contains original research articles that will keep toxicologists and other scientists abreast of the most recent advances in the field.

REVIEW SECTION: provides information on papers dealing with the biochemical, pharmacological, toxicological, medical and veterinary aspects of the subject.

INFORMATION SECTION: divided into the following sub-headings — **Legislation:** deals with world changes in legislation relating to food additives and contaminants, cosmetic and toilet preparations, etc.

Articles of General Interest: — discussions of more general topics and of papers appearing in other journals reflecting progress and opinion in toxicology.

Toxicology: Abstracts and Comments: — These are more than mere digests of papers published throughout the world; they are invariably more lengthy than orthodox abstracts, containing all the salient facts to be found in the original article plus the comments of the Editor and his colleagues.

Summary of Toxicological Data

Letters to the Editor Book Reviews Forthcoming Papers
Bi-Monthly

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FAT RESEARCH

The effects of heat and oxidation on the nutritional and toxicological properties of fats have been the concern of investigators for many years. With the aid of advanced techniques of fractionation, isolation, and identification, lipid chemists are attempting to pinpoint the specific components of heated fats responsible for their biological, sometimes toxic, effects.

The nature and degree of thermal oxidation of fats are functions of time, temperature, and aeration. Oxidation during cooking, baking, or frying is influenced by surface: volume relationships and by the presence or absence of pro- or anti-oxidants. Some protection from air may be afforded by a blanket of steam and water vapour.

The products of oxidation fall into three principal categories:—

- hydroperoxides,
- secondary oxidation products, including carbonyl compounds, hydroxy- and epoxy-fatty acids, and cyclic and polymerized fatty acids.

Hydroperoxides are usually degraded in the intestinal tract prior to absorption and, in any case, appear to be well tolerated by normal laboratory animals. The second class of oxidation products can be absorbed as such but are relatively innocuous according to short-term feeding studies. The effects of high doses of these compounds over the lifetime of animals, by currently acceptable toxicological procedures, remain to be determined. Principal interest centres on the cyclized fatty acids and the oxidized polymers which tend to accumulate on repeated and prolonged heating such as is practiced in deep-fat frying.

Products of oxidation have been shown to induce a variety of toxic responses in rats, including impaired

food utilization, disturbances in liver, kidney, and intestinal function and skin lesions. Carcinogenic and co-carcinogenic effects have also been demonstrated by oral as well as parenteral dosage. The validity of the latter route of administration for assessing hazard in foods is highly questionable. The destructive action of oxidized fats on other nutrients, particularly amino acids, vitamin A, and folic acid has also been reported.

Through the use of high vacuum procedures in the refining and deodorizing of vegetable oils, through the avoidance of air in the processing of oil- or fat-containing foods, and through the judicious use of anti-oxidants in shortening and margarine, oxidative changes can be minimized. However, in view of the increased consumption of commercially fried foods, it would be desirable to investigate more fully the long-term effects of heated fats, particularly of the polymeric and cyclized components, not only in rats but in other species as well.

From "What is New in Food and Drug Research".

BOOK REVIEWS

(Continued from page 611)

book contains 52 tables, 778 literature references, an index and a useful subject index.

In the concluding sentence of his book the author says:— "*Bread is only a component of nourishment, never complete nourishment.*" Would that authors of books on bread had kept, and will keep, this sentence well in mind.

Reviewer: Dr. H. Zentner, Senior Research Officer, The Bread Research Institute of Australia.

FROM

A

TO

Z

THROUGHOUT INDUSTRY

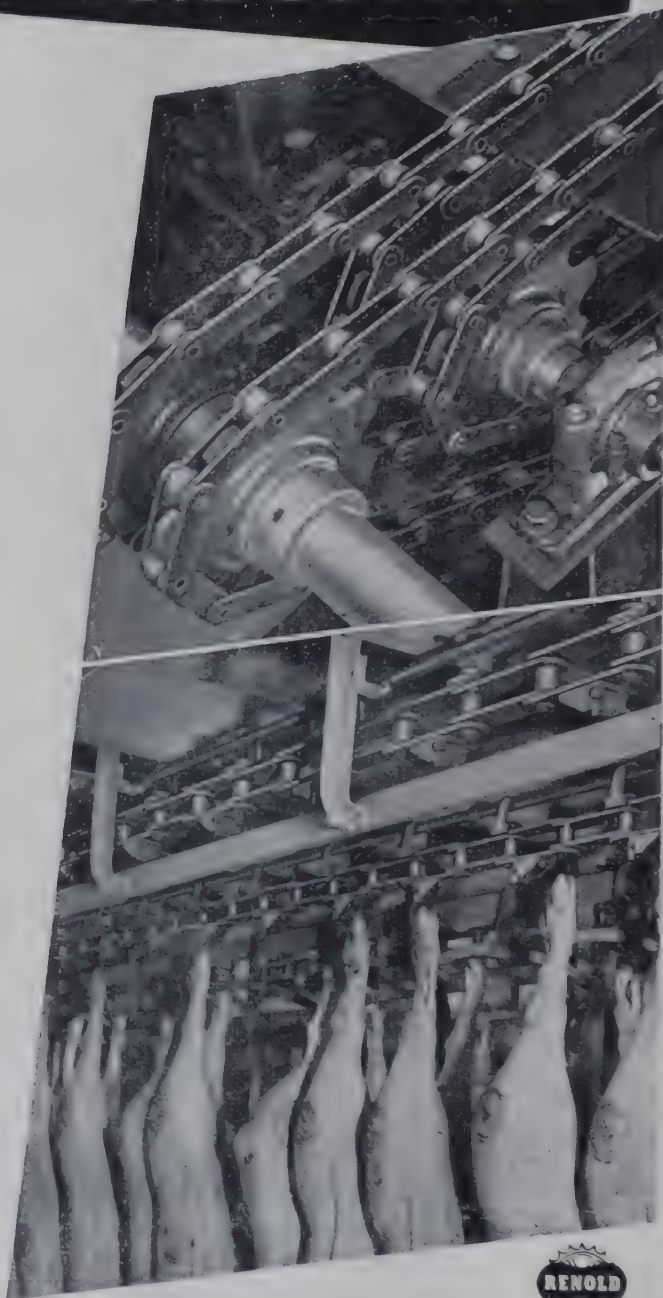
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"VOLUNTARY STANDARD FOR POLYTHENE FILM"

The [British] Packaging Films Manufacturers' Association have recently issued a voluntary code of practice. This is the first of a series of standard specifications for plastic films which they propose to offer.

The purpose of the code is (a) to provide a national standard for the information and guidance of producers, distributors and suppliers; (b) to provide a basis for agreement between producers and suppliers; (c) to provide a basis for fair competition amongst producers; (d) to give the consumer confidence in the quality of these products; and (e) to provide a means of identifying products conforming to this general standard.

Copies of the code are available at 2s. 6d. each from the secretaries of the Association, Peat, Marwick, Mitchell & Co., P.O. Box 121, 301 Glossop Road, Sheffield 10.

"THE CHEMISTRY AND BIOCHEMISTRY OF FUNGI AND YEASTS"

Proceedings of the Symposium on the Chemistry and Biochemistry of Fungi and Yeasts held in Dublin, Ireland, 18-20 July, 1963. 189 pages, Butterworths, London, 1963. £3.15.0.

"FOOD ADDITIVE CONTROL IN FRANCE"

By R. Truhaut and R. Souverain. 69 pages. *Food and Agriculture Organization. (Food Additive Control Series No. 6.) Rome, 1963.*

Among other material, details are given of current regulations and there is an extensive bibliography of material published in France since 1955.

"Specifications for the identity and purity of food additives and their toxicological evaluation"

Emulsifiers, stabilizers, bleaching and maturing agents: 7th Report of the Joint F.A.O./W.H.O. Expert Committee on Food Additives. F.A.O. Rome. 1963.

"FOOD PRESERVATION BY IRRADIATION"

By Grace M. Urrows. 36 pages. *Division of Technical Information, U.S. Atomic Energy Commission. Oak Ridge, Tenn. 1964.*

"TOMATO PRODUCTS"

Tomato pulp (juice, puree) and paste. 20 pages. National Canners Association Research Laboratory. Washington, D.C. 1964.

"CO-ORDINATED COLOR IDENTIFICATIONS FOR INDUSTRY"

By K. L. Kelly, U.S. National Bureau of Standards, Washington, D.C., 1962.

"FRUIT AND VEGETABLE ANALYSIS"

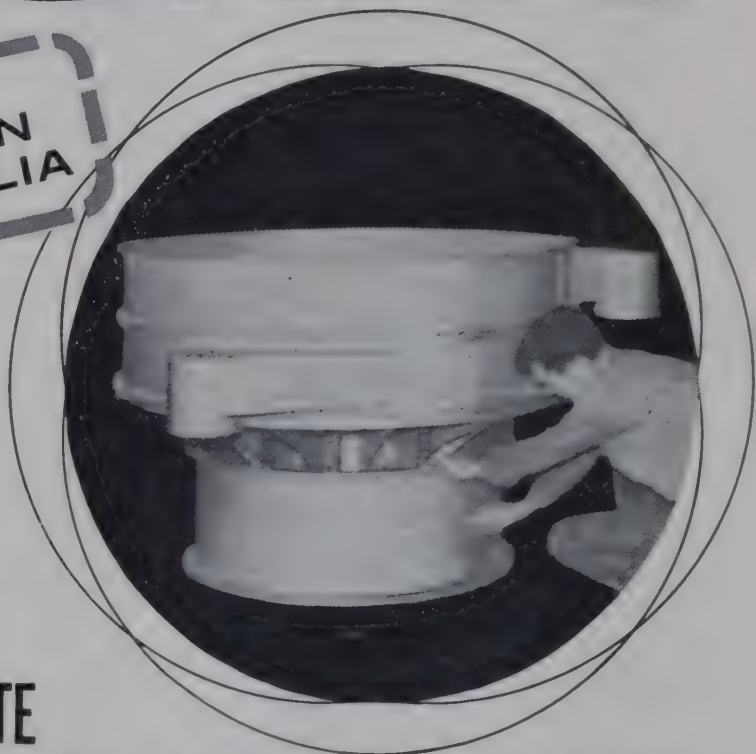
Laboratories engaged in fruit and vegetable research will be interested in a recently published, 47-page book, *"Chemical Methods for Analysis of Fruit and Vegetable Products"*, which has been compiled by J. A. Ruck of the Research Station, Summerland, B.C., Canada. It describes methods of analysis in current use at the Station for a variety of products including jams, jellies and marmalades, fruit juices, candied fruit and peel, dehydrated fruit and vegetables, mincemeat, pickles, wines and cider, sauerkraut, and fruit preserved in sulphur dioxide. Copies are available, as Publication 1154, from the Information Division, Canada Department of Agriculture, Ottawa.

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**"PROCESSES FOR LOW-ACID
CANNED FOODS IN GLASS
CONTAINERS"**

*Bulletin 30-L, 3rd Ed. National
Canners Association, Washington,
D.C., June, 1963.*

**"RADIATION CONTROL OF
SALMONELLAE IN FOOD AND
FEED PRODUCTS"**

*Technical Reports Series No. 22.
148 pages. International Atomic
Energy Commission, Vienna, 1963.*

**"PROCEEDINGS: 5th ANNUAL
RESEARCH CONFERENCE,"**

*Dried Fruit Industry Research Ad-
visory Committee, June 24, 1963.
Monterey, California. 63 pages.
Davis, Calif. 1963.*

Dried fruit research by the West-
ern Utilization Research and Devel-
opment Division of A.R.S., U.S. De-
partment of Agriculture; Moisture
methods and stability studies;
Raisin paste: control of consist-
ency; Bladder stones — the preven-
tative value of dried fruits; Grapes
to raisins; New developments in
preservation of cut dried fruits;
Control of drosophila in vineyards;
Changes in the composition of
prunes during processing and Fac-
tors affecting the stability of shelled
walnuts.

**"BIBLIOGRAPHY OF BEEF
PRODUCTION IN AUSTRALIA,
SUPPLEMENT 1959-63"**

*Compiled by Alma G. Cuely. 169
pages. McMaster Laboratory, Divi-
sion of Animal Health, C.S.I.R.O.,
Sydney, 1965.*

This, the first supplement to the
Bibliography of Beef Production in
Australia, c. 1930-1958, brings the
bibliography up to date to the end
of 1963. Opportunity has been taken
to include a few references which

were omitted from the main biblio-
graphy.

Sections on statistics and analyses
of annual reports have not been in-
cluded in this supplement, but other-
wise, in subject coverage and ar-
rangement, it is similar to the orig-
inal work.

**"THE PHYSICO-CHEMICAL
CHARACTERISTICS OF BOILED
SWEETS AND THEIR
RELATIONSHIP TO STRUCTURAL
STABILITY AND KEEPING
QUALITY"**

*By J. Kelleher, Scientific and Tech-
nical Surveys, No. 41. 42 pages. The
British Food Manufacturing Indus-
tries Research Association, Leather-
head, Surrey, 1963. 15s.*

This Survey is being issued at the
request of the Sugar Confectionery
Panel and has been compiled by Mr.
Kelleher from a preliminary survey
made some seven years ago when
he was in the service of this Associ-
ation, with the inclusion of the re-
sults of work published since then.

The Survey is in three parts. Part
I is concerned mainly with theoret-
ical considerations of the physical
structure of high boilings.

Part II considers the factors af-
fecting the stability of boiled sweets
with special reference to the effects
of moisture absorption. The causes
of stickiness and graining are dis-
cussed and the effects of composi-
tion, particularly the glucose com-
ponents, on the development of
these defects.

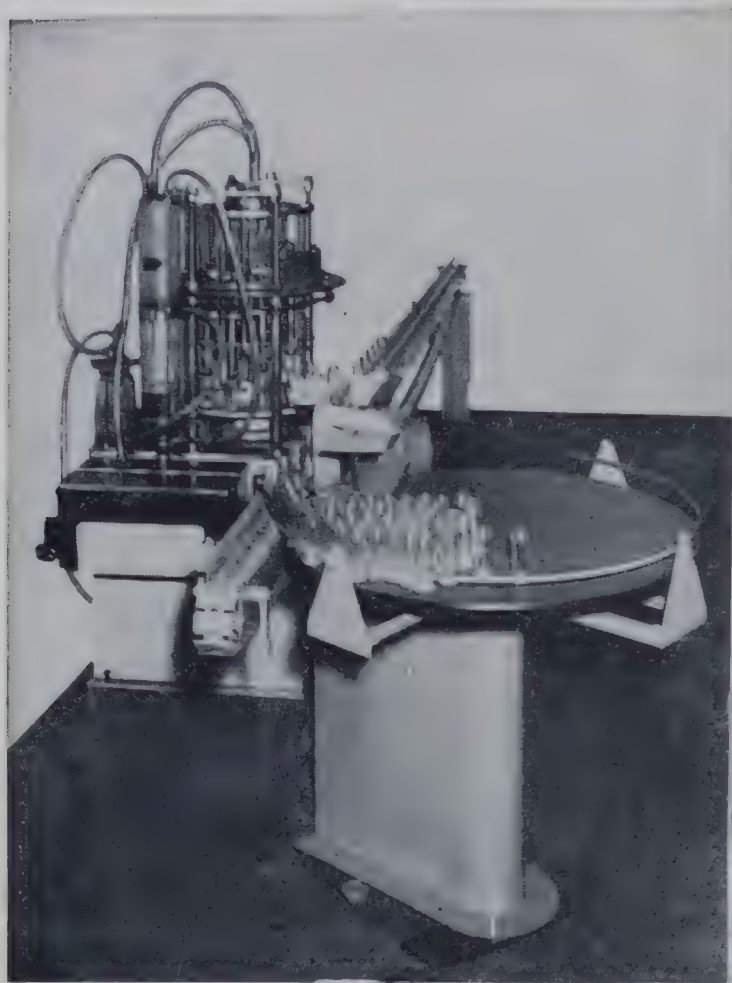
Part III deals with thermo-
dynamic and kinetic considerations
and is accordingly largely mathe-
matical in content. An attempt is
made to derive an equation for
which the rate of crystallization of
a boiled sweet may be calculated.

*There is no strong performance
without a little fanaticism in the
performer.*

—Emerson

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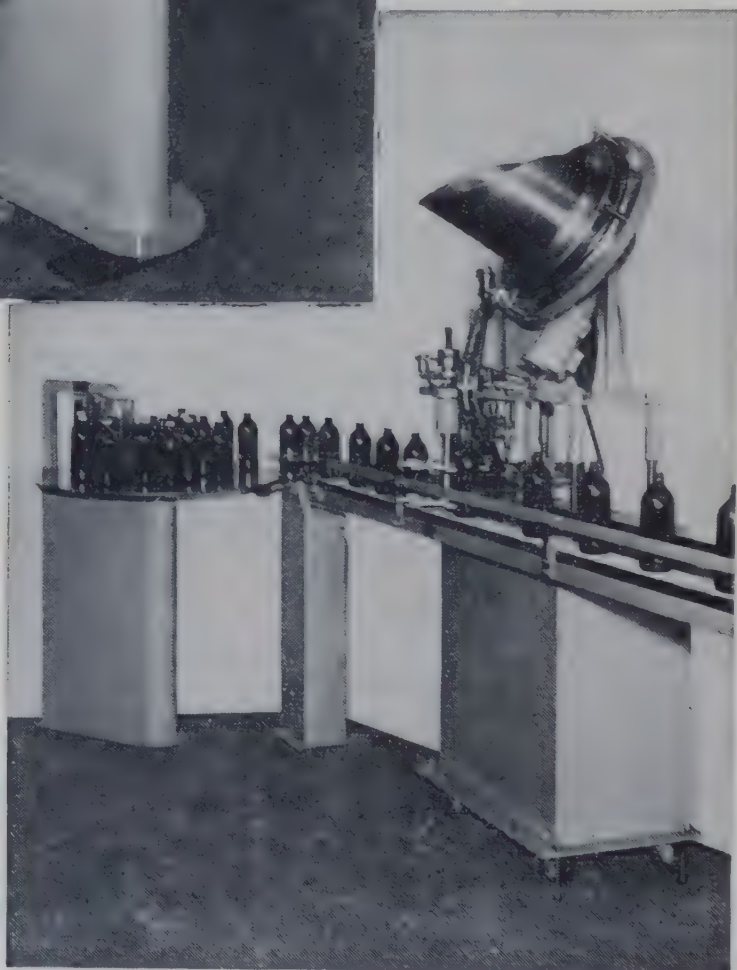
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High-Temperature-Short-Time (H.T.S.T.) Processing

By C. OLIN BALL

Rutgers University, New Brunswick, New Jersey

Heat processing, in the face of competition from several other processing methods, each of which has been regarded by many people as holding the key to the future of food preservation, continues to increase its dominance of the field. Increasing interest in high-temperature-short-time processing techniques is partially responsible for the continued high regard for sterilization by heat.

Of the four factors that count heavily in determining the merits of a process, three lend strength to the claims for the accomplishments of H.T.S.T. processing. These factors are (1) economy of operation, (2) quality of product, and (3) uniformity of product. The fourth factor is sterilization of product, which of course, is done satisfactorily by either H.T.S.T. or conventional heat processing.

Since 1920, the date of the first H.T.S.T. patent mentioned in the literature, many patents have appeared covering processes and machinery classified as H.T.S.T. These may belong to any one of three basic patterns. The first method consists of violently agitating the canned food while it is being heated and cooled to produce rapid heating and cooling of the product. The second method consists of heating the food either in bulk or in open cans, after which it may or may not be partially cooled, sealing the container at its maximum temperature or at some lower temperature above 212°F under pressure after having been partially cooled

rapidly either by flash treatment or otherwise, holding the sealed container to allow the residual heat in the food to complete the sterilization of the container surfaces and of the food, and completing the cooling as rapidly as possible. This procedure is sometimes called the P.F.C. (pressure filling and closing) method. It is not an aseptic canning method.

The third method is heating the food in bulk, holding at the maximum temperature if necessary to complete the sterilization of the food, cooling rapidly either by flash treatment or otherwise, all under aseptic conditions, and finally putting the sterile cooled food into a sterile container aseptically and sealing the container with a sterile cover. This procedure is called the H.C.F. (heat-cool-fill) method. It is aseptic canning.

Depending upon the viscosity of the product, the dimensions of the container, and the volume of the headspace, the rate of heating of a product increases as the rate of rotation of the container on its main axis increases up to from 100 to 200 r.p.m. Either reciprocating motion or end-over-end rotation is more effective than rotation on the axis.

From the Report of Proceedings, Eastern Experiment Station Collaborators' Conference on Food Processing Techniques, October, 1963, held at the Eastern Utilization Research and Development Division, Agricultural Research Service, U.S. Department of Agriculture, Philadelphia, Penn., 19118.

The major effort to advance high-temperature-short-time sterilization during the period 1926-1941 was conducted by the laboratories of the American Can Company led by Ball. The work included studies in all three types of operation and a wide variety of products was studied including milk concentrate, whole milk, cream style and whole kernel corn, various vegetables and vegetable purees and chop suey.

A unit of P.F.C. type of commercial scale operated experimentally on whole kernel corn in 1935 and on a commercial basis in 1936 and, for 20 years, starting in 1940, a commercial H.C.F. machine operated commercially on concentrated chocolate milk drink. In the 1940's activity in the field was quickened by the advent of investigators under various sponsorships, including two or three universities and various container manufacturers. The most prominent development during this period was that of the Dole Aseptic Canning System on H.C.F. type system for liquids by the Dole Engineering Company. There are now 57 installations of this system, of which seven are in foreign countries. Approximately half of the units are reported to be operated on a commercial scale, most of them on concentrated dairy products.

Two difficulties have caused an inordinately low rate of acceptance of H.T.S.T. by the canning industry. The first is physical instability of H.T.S.T. processed milk concentrates, which has been recognized as a problem since 1932 and which persists today as only a partially solved problem. Various influencing factors suggest strongly that the instability (gelation) is triggered by enzymes. Assuming this to be the case, the industry appears to be faced with the problem of developing a complex time-temperature cycle to accomplish preservation of the food. The second major retarding factor is an engineering stalemate, evidenced as failure to design heat exchangers equal to the task

of sterilizing the foods in bulk at a satisfactory rate for a satisfactory length of time.

The major difficulty is experienced with foods of particulate nature. During the last five years, William M. Martin, the inventor of the Dole Aseptic Canning System, has developed a heat exchanger for products consisting of solid pieces in heavy sauce in which the product is heated in direct contact with superheated steam. This device appears to have promise.

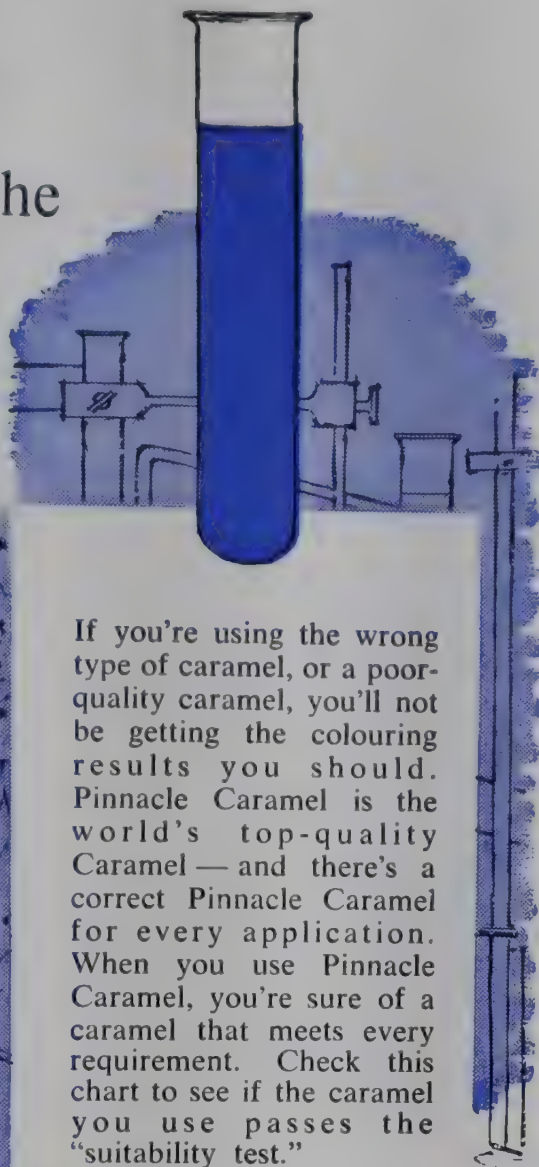
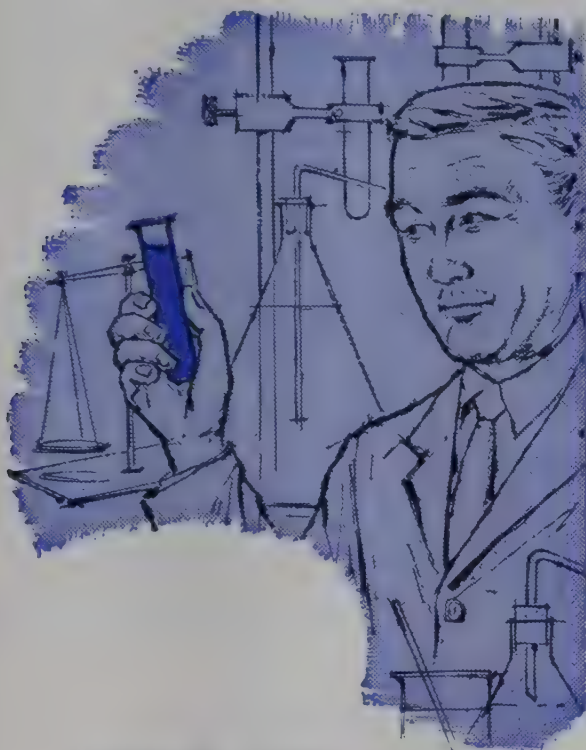
While the advance of H.T.S.T. processing has been slow, nevertheless, both the number of research and development projects on equipment and methods for utilizing H.T.S.T. processes and the number of commercial applications of the principle of H.T.S.T. have increased manyfold in each decade since 1920. Today, it is safe to say that the laboratory of every large canning organization is either carrying on H.T.S.T. research and development work or is keeping as closely as possible in touch with developments by others. The indication is that every baby food packer and every large meat packer is either associated with some active H.T.S.T. research or is contemplating such research.

LARGE SCALE FISH IRRADIATOR ON STREAM

The U.S. Atomic Energy Commission is using a combination of irradiation and refrigeration in the Marine Products Development Irradiator to keep fish fresh for 30 days. Fish fillets are packed in plastic bags and placed in metal fillet tins of 30 lb capacity. The tins move through a labyrinth into a gamma cell of cobalt-60 source. A tab on the package changes from yellow to red during irradiation.

The plant processes marine products at a rate of up to 1 ton per hour at a dose rate of 250,000 rad.

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If you're using the wrong type of caramel, or a poor-quality caramel, you'll not be getting the colouring results you should. Pinnacle Caramel is the world's top-quality Caramel — and there's a correct Pinnacle Caramel for every application. When you use Pinnacle Caramel, you're sure of a caramel that meets every requirement. Check this chart to see if the caramel you use passes the "suitability test."

CHECK THIS CARAMEL SUITABILITY CHART

These are the caramel requirements for various food manufacturing industries. Pinnacle Caramel passes all these tests. Does the caramel you use?

Industry	Suitability Test
Bakers and Pastrycooks	Must be quality caramel with high colouring power and uniformity.
Coffee Extract	Must have uniformity and be tolerant to the negatively charged material in the extract.
Sauce and Pickle	Must have high stability and colouring power. Generally electro-positive.
Vinegar	Must have high colouring power, stability to acids, also tannin resistance.
Meat Canning, Pudding and Cake	Must be a quality caramel with deep, rich colouring power.

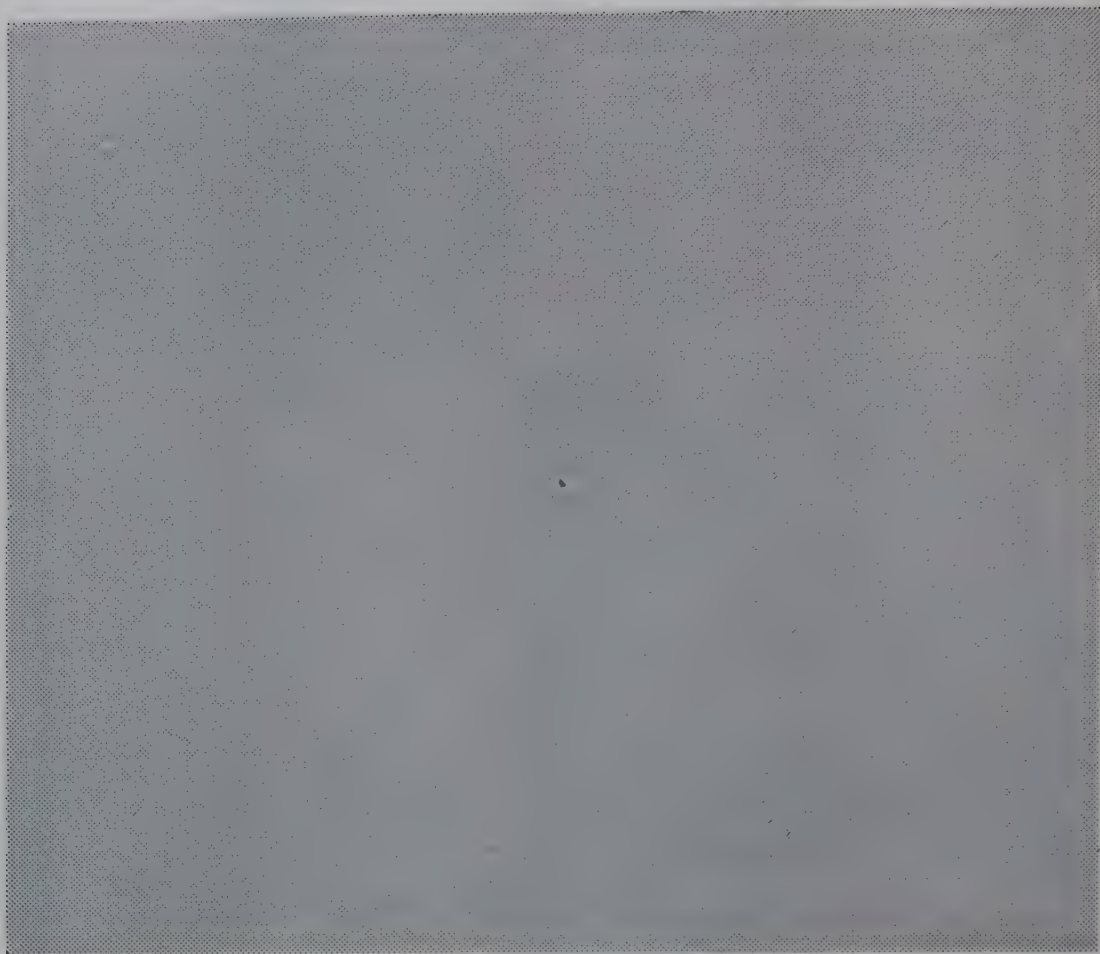
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GLF/17

FROZEN FOODS

New Thaw Indicator

"Food Engineering" (Nov., 1964) report that A. E. Gessler have developed a bifunctional chemical thermometer, U.S. Patent No. 3,065,083, which monitors the temperature of frozen foods from processing plant to consumer.

The indicator which is the size of a postage stamp is attached to the food packages and if the pre-selected time and temperature are exceeded it turns from light beige to vivid red.



U.S. Chain Uses Nitrogen Freezing

The Great Atlantic & Pacific Tea Co., better known in the U.S. as the A. & P., has installed a unique liquid nitrogen freezer for the sole purpose of processing its bakery products.

The Cryotransfer unit, manufactured by the Liquid Carbonic Division of General Dynamics Corp., Chicago, is located at A. & P.'s National Bakery Division at Flushing, N.Y.



Liquid Nitrogen to Freeze Fish

Fish frozen by the liquid nitrogen technique is expected to have better colour, flavour and texture than the conventionally frozen product, although it is possible that rapid cooling by liquid nitrogen could lead to cracking and shattering of the product.

Experiments carried out on had-dock fillets by the U.S. Bureau of Commercial Fisheries Technological Laboratory show that no damage of the product occurs when liquid nitrogen freezing at nominal rates of 2.0 to 7.0 cm/hour were employed.

Frozen Vegetable Off-Flavour Linked to Fat Rancidity

F. Lee of the Department of Food Science and Technology, New York Agriculture Experiment Station, has found that off flavours in frozen vegetables are due to rancidity products that have developed from the small amount of fat present. Earlier tests have indicated that residual enzymes in insufficiently blanched vegetables may be responsible for the deterioration in the fatty material.



Quick Frozen Special Diets

Prepared frozen food diets by the Special Products Division of Armour & Co. are meals comprising low-salt and low-calorie meat and poultry entrees. The entrees are packed 24 to a container and can be brought to serving temperatures in 3 to 5 minutes in their individual pouches by several heating methods, from simmering in water to high compression steamers or microwave ovens.



F.F. in Japan

Frozen foods are creating a high level of interest among the Japanese people, affording an outstanding opportunity for the frozen food industry in Japan. This was the unanimous opinion of American food processors following the first full-scale promotion of U.S. processed foods ever staged in Japan, which took place at the United States Trade Centre in Tokyo, March 8-19, 1965.



Tackling F.F. Display Cabinet Defrosting

A West German firm of frozen food retailers has taken active steps to solve the problem that retailers are tardy with the defrosting and cleaning of F.F. display cabinets.

— Continued on page 627

CONCENTRATED JUICES

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One volume of concentrate diluted with six volumes of water
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COL-FLO 67. Cook-up type waxy maize starch with outstanding freeze-thaw and

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CLEARJEL. A processed waxy maize starch. Gives you viscosity without set. Provides good production tolerance at low pH's and high temperatures. Also available in heavier form as CLEARJEL S. For gravies and sauces for dinners and specialties.

INSTANT CLEARJEL. Similar to Clearjel in properties but requires no cooking . . . no cooling. Saves time, storage, labour costs. No damage to whole fruit. For instant fruit pie fillings with excellent clarity, texture, fruit appearance. Freeze before or after baking.

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FROZEN FOODS

(Continued from page 623)

Looking for the root cause of this evil, they found that retailers don't know *where* to put the frozen foods when defrosting the cabinets.

The firm is now offering a valuable service to retailers which should improve frozen food merchandising significantly in West German food stores and supermarkets. This service consists of assisting the retailers in defrosting and thoroughly cleaning their frozen food display cabinets on a regular basis.

The company sends service personnel with empty refrigerated trucks to the supermarkets where they remove the frozen foods from the cabinets and place them in the refrigerated truck. Then they defrost the display cases, clean them thoroughly, and return the frozen foods to the cabinets. This entire service is provided free of cost to the retailer.

•

Crust Freezing

Following a suggestion that cooling with crushed carbon dioxide may be cheaper than cooling with nitrogen, the Liquid Carbonic Division of General Dynamics Corp., Chicago, has a *chicken vibrator* equipped with special non-clogging nozzles that dispense dust-size particles of dry ice.

When such dry ice is applied to coat produce, it volatilises rapidly leaving no residue, but freezes the surface so quickly that bloom or colour of the frozen food is well retained.

•

Frozen Fruit and Vegetables More Nutritious?

A comparison made by the American journal "*Quick Frozen Foods*" showed frozen fruits and vegetables to have greater amounts of niacin and pantothenic acid, as well as vitamins A₁, B₁, B₂ and C than their canned counterparts in 85 out of 104 instances. Equal amounts are shown

by competitive versions in three instances, leaving canned foods superior in only 16 cases. Frozen vegetables showed greater amounts of vitamins in 43 out of 46 comparisons; frozen fruits in 27 out of 36 comparisons and frozen juices in 15 out of 22 comparisons. Products evaluated were asparagus, green, lima and wax beans, corn peas, spinach, turnips, apricots, blueberries, cherries, peaches, pineapples and grapefruit, orange and pineapple juices.

•

Common Market — Frozen Food Standards

The Common Market has issued a series of directives providing quality specifications to be observed in the frozen fruit and vegetable industry. The proposed directives are still under consideration prior to final adoption.

The specifications deal with such matters as standardized sizes and net weights of frozen vegetable and fruit packages, precise information to be printed on all labels, and quality control during manufacture. A series of definitions and descriptions accompany the regulations. Very precise definitions of terms regarding temperature in storage and freezing processes are provided. In addition, the amount of additives to various products are detailed. Among the additives discussed are syrup, salt, sugar, and citric acids. The definitions also set forth in great detail quality norms for individual products.

•

Home Microwave Ovens

A microwave oven for heating frozen foods in the home has been developed by Husqvarna Vapenfabriks, Sweden. Said to be the first microwave oven designed for household use, the new oven generates heat directly into the frozen food by means of a microwave field. The frequency of the heat-generating microwave field is 2,500 million cycles per second.

Research into Water Vapour Transmission Rate of Packs

The Food Preservation Division of the C.S.I.R.O. has commenced a programme of studies designed to provide data on the water vapour transmission rate of packaging materials

Product protection is a primary function of containers for the packaging of foods. Unless adequately protected, foods may develop undesirable changes in colour, texture, flavour and nutritive value arising from the loss or pick-up of gases and vapours during distribution and storage. One of the most important problems in food packaging concerns changes in moisture content since it is usually desirable to maintain the moisture content of foods within certain limits for the retention of quality.

All packaging materials made from cellulose, plastic, thin metal foils, or combinations of these basic materials are permeable to water vapour under the influence of a relative humidity gradient. However, the water vapour transmission rate (W.V.T.R.) varies widely among the different materials, and it is an important property governing the choice of a container material for a specific food.

The W.V.T.R. of materials is usually determined by simple gravimetric techniques on small samples of the material at temperatures between 20-38°C and at specified relative humidity gradients, and data on a wide range of materials under these conditions are readily available in the literature.

It is known, however, that temperature has an appreciable effect on the W.V.T.R. of packaging materials, and that the effect differs among the various materials. At temperatures above 0°C, it is often possible to convert W.V.T.R. data

for some materials from one temperature to another by established mathematical procedures, but at temperatures at or below 0°C, there is a lack of reliable data on the W.V.T.R. of food packaging materials, and on the validity of the usual mathematical relation.

In an attempt to clarify some of the above uncertainties, the C.S.I.R.O. Division of Food Preservation has commenced a programme of studies designed to provide data on the W.V.T.R. of materials used locally for the packaging of frozen foods. The apparatus is similar to that described in the Tappi method T 482 m-52. Samples of 20.6 in.² are sealed with wax across the openings of shallow aluminium dishes containing anhydrous calcium chloride. The test assemblies, supported in racks, are enclosed in a metal box packed with crushed ice and housed in a constant temperature room at -20°C. The dishes are weighed initially and at intervals of one month over a period of four-six months, and the W.V.T.R. calculated from the moisture up-take plots.

W.V.T.R. ranging from 0.004-0.007 g/100 in.²/24 hr. at -20°C, 100 per cent R.H. were observed on 0.001 in. low-density polyethylene, 0.001 in. polyvinyl chloride-polyvinylidene chloride copolymer, 300 and 400 gauge MXXTS regenerated cellulose, 300 gauge MSAT regenerated cellulose, and a laminate of 0.0005 in. polyester to 0.001 in. low-density polyethylene. Samples of 0.014 in. carton board waxed on both sides and similar board waxed on one side and coated with 0.0005 in. polyethylene on the opposite side produced W.V.T.R. of 0.23 and 0.023 g/100 in.²/24 hr. respectively at -20°C, 100 per cent R.H.

— Continued on page 635

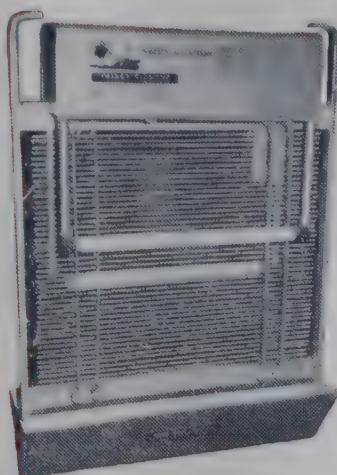
hygiene conscious??

Q. What is it?



Ans. This is a picture of a fly being electrocuted.

Q. What did it?



Model A6360
INSECT-O-CUTOR
UNIT

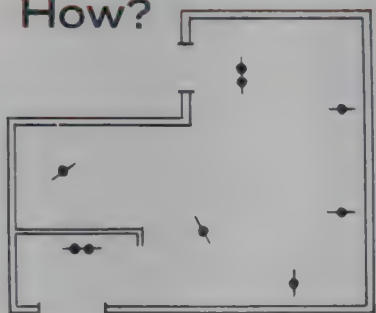
Electrified Grid, safe to humans, death to insects.

Black Light attracts insects to electrified grid.

Insect Catch Tray collects all insects killed.

Ans. SIMON INSECT-O-CUTOR. This is a picture of an Insect-o-Cutor unit which attracts, kills and collects all flying insects.

Q. How?



Ans. Attraction to 'black light' and contact with electrified grid. Various model Insect-o-Cutor units are available and protection from flying insects is given by their use as a designed system. We provide a layout of your building as above, showing positions and types of Insect-o-Cutor units recommended to overcome your problem.

Q. Why?

Ans. To provide the highest level of protection from flying insects available today!

INSECT-O-CUTOR systems attract, kill and collect all types of flying insects—

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FOOD TECHNOLOGY IN AUSTRALIA, October, 1965

629

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Conference on Food Science for Industry

To meet the convenience of food industry executives from the southern States, the Division of Food Preservation held its latest "*Food Science in Industry*" conference in Melbourne. The function, held on November 24, 1964, was attended by over sixty executives and was presided over by Dr. I. W. Wark, a member of the C.S.I.R.O. Executive. After Dr. Wark's opening address, a number of short talks were given by senior staff of the Division.

Dr. J. R. Vickery, Chief of the Division, outlined some of the newer food dehydration processes designed to improve retention of flavour and make the product easier to rehydrate. These processes included foam-mat drying, puff drying, fluidized-bed drying, freeze drying, and the Birs process.

Progress in the preservation of food by ionizing irradiation was then reviewed by Dr. W. J. Scott, Assistant Chief of the Division. He said that doses of radiation sufficient to provide complete sterilization usually caused off-odours and off-flavours and as yet it was not known how to prevent this. However, some products had been successfully treated overseas. A sterilization process for canned bacon had been approved by the U.S. Food and Drug Administration, and an irradiation process to prevent sprouting in potatoes was in commercial use in Canada. Dr. Scott stated that although spectacular advances were unlikely there was good reason to expect useful progress in this field within the next few years.

Mr. J. F. Kefford, Senior Principal Research Scientist, spoke on food packaging. The need for reliable techniques for predicting container performance was stressed, and reference was made to the properties of the great variety of flexible films now available. Mr. Kefford also

discussed problems associated with the use of cartons, which as outer containers for processed foods were now used universally and which were finding increasing application as containers for fresh fruit.

The application of the fluidized-bed principle and of liquid nitrogen refrigeration to the freezing of food were discussed by Mr. J. Shipton, Senior Research Scientist. The fluidized-bed technique was applicable only to products capable of being levitated by a vertical flow of air, but the process was significantly cheaper than traditional blast freezing. Liquid nitrogen had attractive properties as a refrigerant, and there were no obvious technical problems in its application to the freezing of food. The extent to which it would be used would depend largely on economic factors.

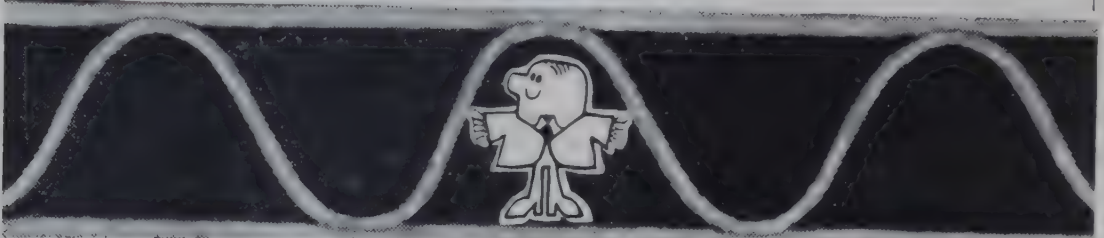
COLOUR OF TRANSLUCENT FOODS

Reflectance measurements are rapid and non-destructive indicators of food-product quality. In a paper by A. C. Little ("*J. of Food Science*", 29, 782, 1964) the problems of sample presentation of translucent samples are considered. Two systems were evaluated both subjectively and objectively; one a berry-applesauce mixture with colour differences controlled by addition of red food colouring; the other agar and cellulose with controlled amounts of yellow food dye.

The panel was more successful than photo-electric tristimulus colorimetry in ranking samples with deep layers. When thin layers of sample backed by white standard plaques were measured the results conformed closely to visual experience. The reasons for the inaccuracy of the instrument in samples of deep layers are discussed.



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BEEF RESEARCH

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Projects to be undertaken include investigations into the improvement, management and utilization of pastures and fodders; cattle husbandry; diseases and pest control; economics and marketing; and survey and extension work in relation to beef production. Grants will be made to State Departments of Agriculture, to Universities undertaking beef cattle research, C.S.I.R.O., the Northern Territory Administration and the Commonwealth Bureau of Agricultural Economics.

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Research into Water Vapour
Transmission Rate of Packs

(Continued from page 628)

These results show that the W.V.T.R. at -20°C of the regenerated cellulose and plastic films tested fall within a narrow range, but the coated carton boards are more permeable to water vapour. Further tests on a range of regenerated cellulose and Nylon 11 materials are in progress.

From "Packaging News", May, 1965.

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— Anon.

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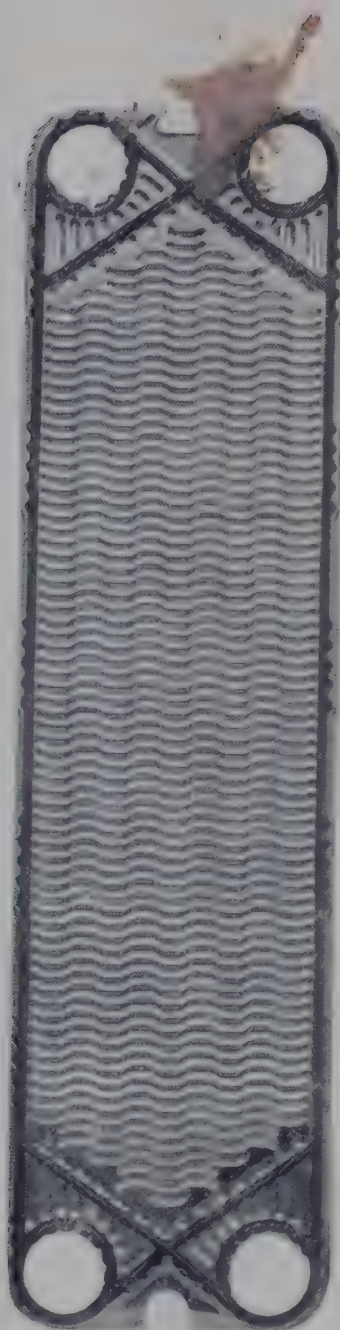
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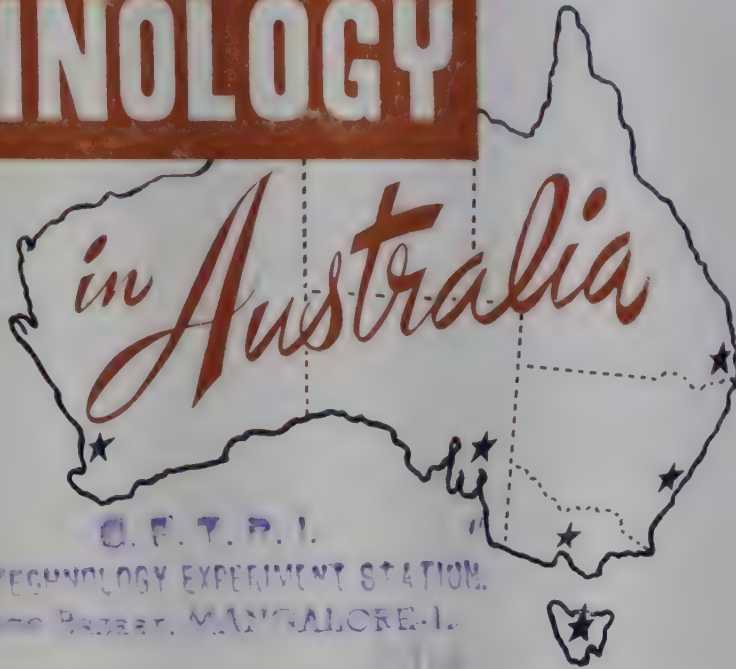


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FOOD TECHNOLOGY



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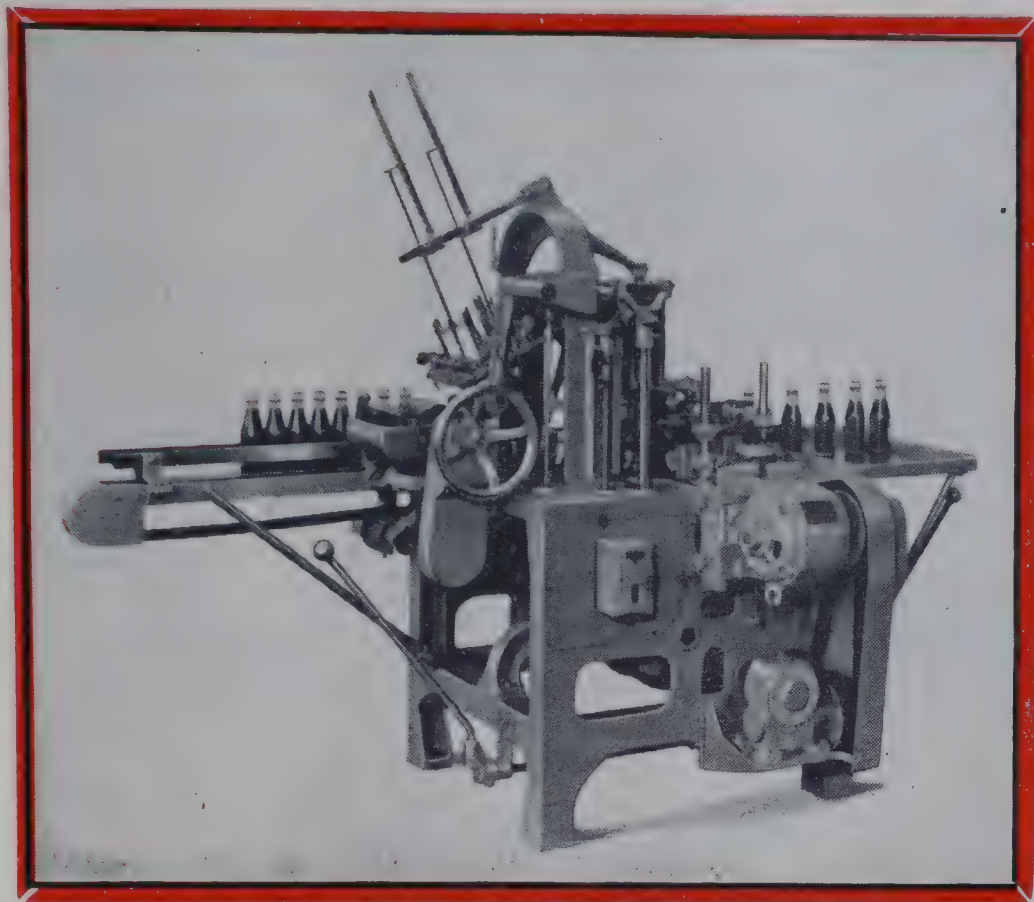
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Acting Editor:

R. A. EDWARDS, A.S.T.C., B.Sc., Ph.D.,
Senior Lecturer in Food Technology, The
University of New South Wales.

Business Manager:

S. M. ADAMS.

Office:

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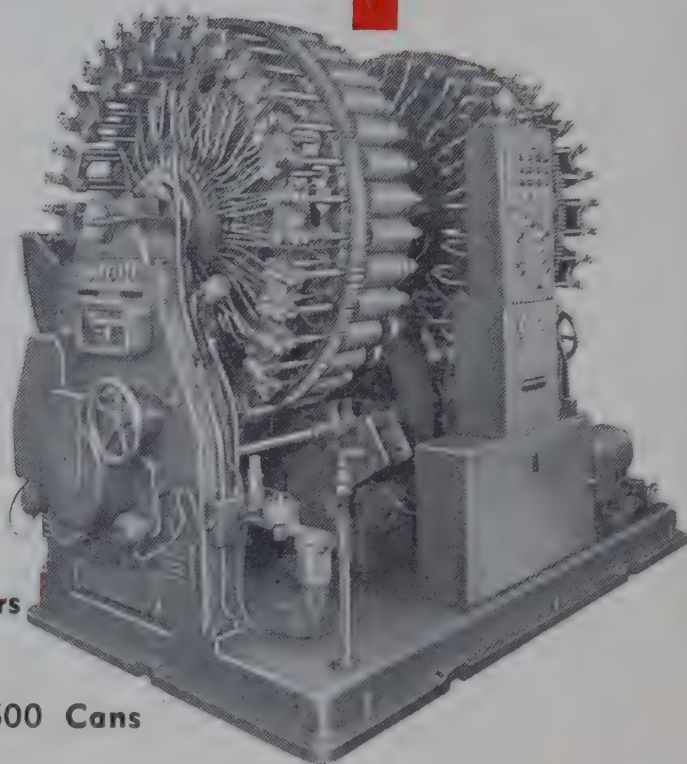
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Scholars and Scholarships

When Cecil John Rhodes wrote his first Will in 1877, he was a young man of 25 years of age who had not yet achieved the distinction that was to mark him in later life. Yet, at that time, he established the concept that was to be repeated and clarified in the succeeding six Wills he was to write before his death in 1901.

In establishing the *Rhodes Scholarships*, Rhodes sought to honour those young men who showed promise of outstanding achievements in later life, and also to honour those qualities in men that perhaps Rhodes believed himself to lack. He sought not the intellectual, nor as some have supposed, the athlete. Some Rhodes Scholars have been one, some the other. Some indeed have been both, but most have been neither. Rhodes sought "*the best man for the world's fight*"; an all-rounder with a particular talent, and in whom distinction of intellect and character were prime requirements.

Since the inception of the scheme in 1903, some 3000 Rhodes Scholars have been elected, bringing distinction not only to the men so honoured but a reflected glory for the circumstances that produced them. For the Rhodes Scholarship is perhaps the highest honour that can be bestowed upon the aspiring young professional.

For the first time in Australian history, and perhaps for the first time in the history of the award, the young man chosen as N.S.W.

Rhodes Scholar for 1966 is a food technologist. He is Ian William Dawes, a fourth-year student in the Department of Food Technology at the University of New South Wales. Dawes has a brilliant academic record and achievements in the non-academic sphere that have been judged to match the demanding requirements of the late Mr. Rhodes.

Dawes was attracted to the study of food technology by the industry-sponsored scholarship scheme that has operated successfully in the University since 1957. He was awarded the William Arnott Scholarship in 1962 as the result of a maximum pass at the N.S.W. Leaving Certificate Examination. Now he will continue in research until he goes to Oxford University to pursue the doctorate degree. It would be idle to speculate on where he will go from there — industry, university or research organization — but it seems certain that he will always retain a slant toward foods and food technology.

The food industry might be excused for taking considerable pride in the fact that one of *their men* has been chosen for this coveted award, and that one of the objects of undergraduate scholarships — to attract first class people to an interest in food technology — has been truly met.

It might also indicate that, in our modern society, the technologist is now being accorded his rightful status on the same level as those from the more classical disciplines.



Studies of Malting Behaviour in Barley

By D. H. B. SPARROW,

Department of Agronomy, Waite Agricultural Research Institute,
Adelaide, S.A.

The increasing pace of scientific research is affecting the malting and brewing industries just as it is other industries. Particularly since 1945 considerable research has been carried out on the problems associated with malting and brewing. The old empirical traditions are being replaced by new methods based on a rational understanding of the processes involved in turning barley into malt and then into beer.

My interest and concern in this address is with malting and I intend to present a generalized picture of the role of gibberellic acid in barley germination and the ways in which this role can be exploited in malting.

It is appropriate, first to consider the structure of a barley grain as a preliminary to discussing the mechanism of germination. The bulk of the grain is made up of the starchy endosperm, which when hydrolyzed provides the fermentable material for brewing, or in normal seed development, material for the growth of the embryo. The embryo consists of the young shoot and root, and the *scutellum* which lies closely attached to the endosperm. The outermost part of the endosperm is made up of a layer of special cells, termed the *aleurone*. The above structures are enclosed within three seed coat layers; the *testa* and *pericarp*, which are the remains of the ovary wall, and the husk which is the remains of the floral leaves (the lemma and palae). Unlike the morphologically similar wheat chaff, barley husk is closely attached to the grain.

In normal germination, the endosperm supplies the material for the growth of the embryo and young seedling; enzymes are developed and the endosperm contents are gradually hydrolyzed and passed to the embryo. Malting is germination controlled to bring about maximum enzyme development and endosperm degradation with minimum embryo respiration and rootlet growth. In malting, the grain is first soaked (steeped) in water to raise its moisture content to about 44 per cent; the grain is then drained and set to germinate until it is modified, *i.e.* until the endosperm structure has broken down to the consistency of soft cheese. It is then dried on a kiln to stop germination. The dried product is termed malt which at this stage is friable, the cell wall structure of the endosperm being broken down but the starch hydrolysis not yet complete. This takes place in the brewery when the ground malt is extracted with hot water in the mash tun. The

An Address to the 15th Annual Convention of the Institute of Food Technologists, Australian Regional Sections, Adelaide, S.A., 1965.

liquid extract is termed *wort*. In analysis, a laboratory-produced wort, or hot water extract, is measured for its percentage of dissolved malt substances.

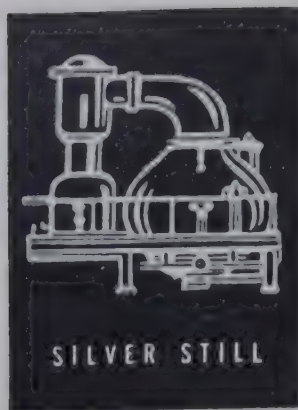
In the past, it was considered that the embryo both controlled germination and provided the bulk of the enzymes that brought about the breakdown of the endosperm. The enzymes were thought to pass from the scutellum to the endosperm to bring about the characteristic pattern of endosperm degradation which proceeds concentrically outwards from the embryo end of the grain. A suggestion by Brown and Morris (1890) and Brown and Escombe (1898) that the aleurone layer was in some way implicated, was until recently largely ignored.

Gibberellic acid is a metabolic product of a fungus that infects rice plants. Japanese workers (Hayashi 1940) were the first to isolate this substance and demonstrate its action as a plant hormone. Later other Japanese (Munekata and Kato 1957) were the first to report its use in malting. But it was Sandegren and Beling in Sweden in 1958 who developed its practical application and opened the way to its general acceptance as a valuable malting adjunct. For malting, barley is treated with from 0.1-1.0 ppm of gibberellic acid calculated on the basis of g/ton of the dry grain, and applied either as an addition to the steep water or as a spray at the start of the germination period. The treated grain germinates more rapidly than the untreated, the endosperm degradation is quicker and so the malt is ready for kilning earlier and often the malt will give an increased hot water extract. Gibberellic acid can be used to enhance the malting of what would previously have been considered unsuitable samples of grain. One disadvantage of the treatment is that proteolysis proceeds further than in normal malt giving undesirably high values for soluble nitrogen compounds in the wort. In 1961 Macey and Stowell in Britain reported that additional

treatment with potassium bromate (at levels of 100 ppm) reduced proteolysis without otherwise detracting from the advantages of the gibberellic acid treatment. This combination of treatments is probably the most widely used at present and has been patented by Associated British Maltsters.

Fundamental investigations directed towards the mode of action of the applied gibberellic acid within the germinating barley grain have been carried out at the same time as the practical developments. In 1959, Radley working for I.C.I. in Britain found a gibberellin-like substance in normal malt and more recently Jones, MacMillan and Radley (1963) have identified a gibberellin in immature barley. In 1960, Yomo in Japan showed that the germinating barley embryo produced a gibberellin-like hormone which activated the endosperm half of the grain to produce hydrolytic enzymes. At the same time Paleg, at the Waite Institute, found that the non-embryo halves of grain would, when treated with gibberellic acid, produce a number of hydrolytic enzymes and release reducing sugars into the culture medium. In fact the half grain is extremely sensitive to gibberellic acid and is now used in bioassay, a measurable sugar release occurring in the presence of a concentration of gibberellic acid as low as 0.00001 ppm. In 1962 MacLeod and Millar in Scotland, using dissection techniques were able to demonstrate that gibberellic acid acts by stimulating the aleurone layer to release enzymes rather than by activating enzymes already present in the endosperm. And in 1963 Paleg was able to demonstrate that α -amylase was released from aleurone cells treated with gibberellic acid.

From these studies it is now generally considered that the embryo controls endosperm modification chiefly by the production of a gibberellin which diffuses to the aleurone and activates the cells there to



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release the enzymes which modify the endosperm.

During malting the artificially applied gibberellic acid would augment the natural gibberellin. But if gibberellic acid is applied the growth of the embryo is probably not essential to successful malting. It can be appreciated that during malting the growth of rootlets and the respiration of the embryo causes a loss of material to the maltster, usually of the order of 8-10 per cent. Gibberellic acid treatment, by speeding up modification and decreasing germination time, can bring about a slight reduction in this loss but this should be reduced to lower levels by embryo removal or inactivation.

In 1962 Paleg and Sparrow used a test tube malting technique to show that grains from which the embryos had been removed could be modified. Four treatments were used; 5 g samples of grain with and without embryos (excised by hand) were steeped in water or a 1.0 ppm solution of gibberellic acid. Subsamples of 5 grains were removed daily during the germination period and

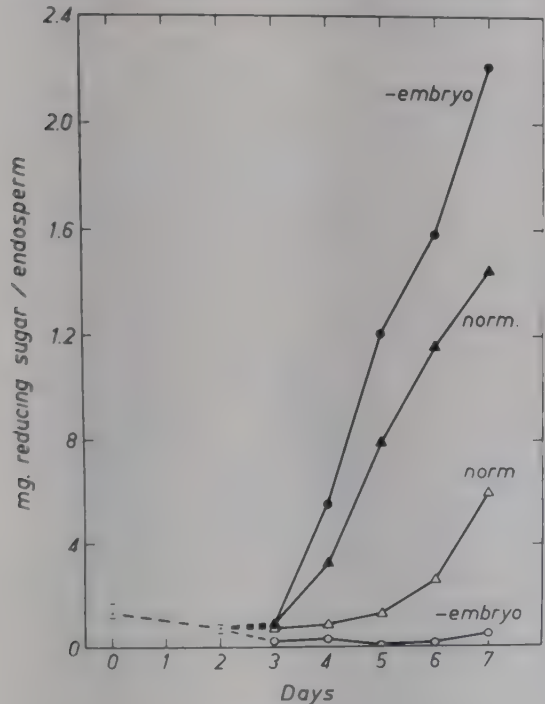


FIGURE 1
Reducing Sugar Content of Endosperm.
Untreated — Open symbols.
Treated 2ppm Gibberellic Acid — Closed symbols.

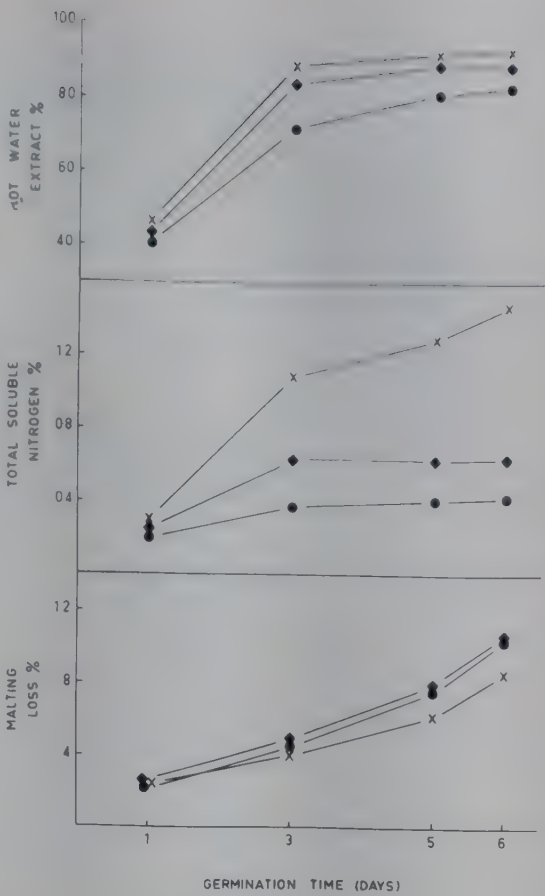
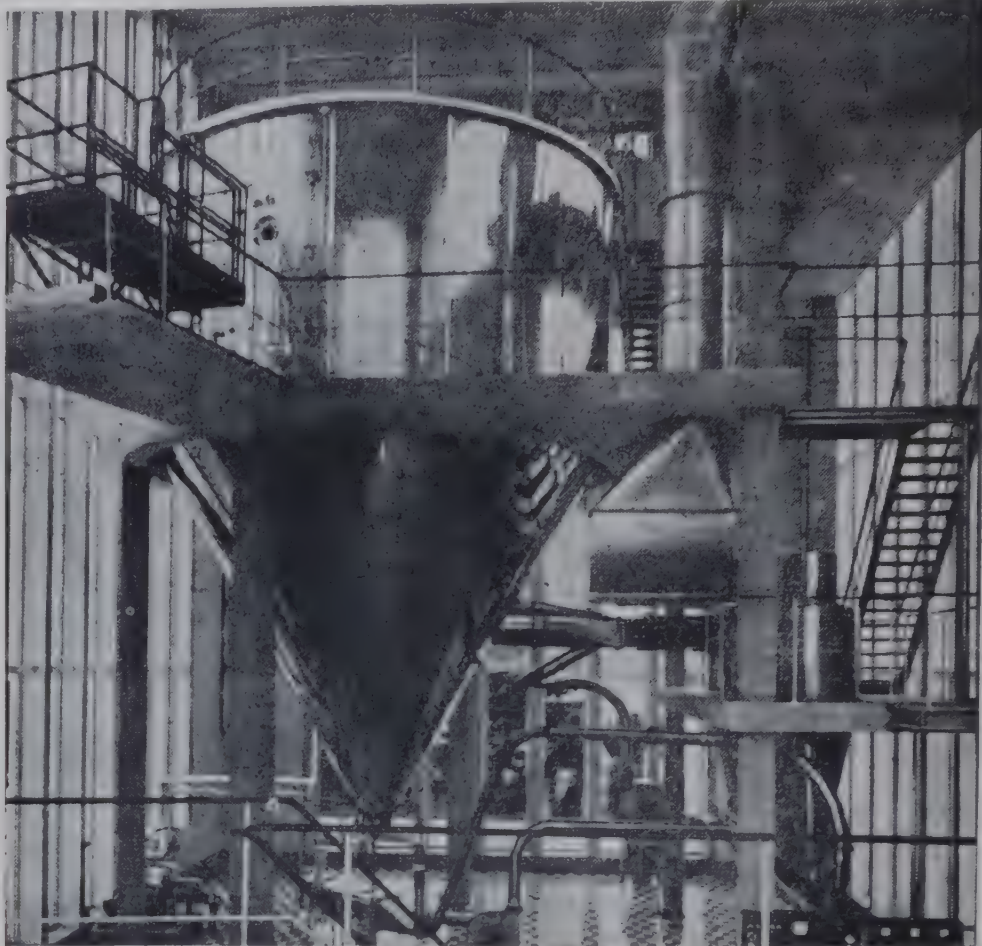


FIGURE 2
Malt Analyses of Dehusked and Embryo-excised Grain.
● — Whole Grain, water-steeped.
◆ — Whole Grain, steeped in GA₃ 1 ppm.
× — Embryo-excised grain, steeped in GA₃ 1 ppm.

their endosperms assayed for reducing sugar and soluble nitrogen (Figure I).

In the absence of an embryo or gibberellic acid treatment there was little endosperm degradation and little production of reducing sugar. The embryo-excised grain with added gibberellic acid showed a similar sugar and nitrogen release pattern to untreated grain with intact embryo but degradation took place more rapidly.

Following this, Sparrow (1964) repeated the experiment using 25 g samples of a commercial barley and a micro-malting procedure that closely simulated commercial malting, including kilning. The dried malts were analyzed by standard malt analysis methods. The results are presented in Table 1. The values are higher than those obtained commercially because the grains were



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dehusked before malting to facilitate embryo removal. In this experiment only three treatments were applied; grain with embryos were steeped in water or a 1.0 ppm solution of gibberellic acid; after steeping embryos were removed from a subsample of the latter to give the third treatment, embryo-excised grain with gibberellic acid (Figure 2).

It can be seen that, over the six day germination period, an increase in percentage extract and soluble nitrogen occurs in the water treated grain. Gibberellic acid treatment speeds up this rate of increase, and removal of the embryo further enhances the effect of gibberellic acid, such that high levels of extract are obtained in only three days germination. In contrast, as would be expected, embryo removal reduces the malting loss. It is possible, then, to produce acceptable malts from embryo-excised barley. Further there seems to be an enhanced effectiveness of gibberellic acid treatment as a result of embryo removal. As it was already known from Yomo's work that the stimulatory effect of gibberellic acid requires oxygen, it was suggested by Sparrow that the removal of the embryo had ruptured the pericarp-testa and so made oxygen more readily available at the aleurone than in intact grain.

It is accepted then that embryo activity is unnecessary in malting, and in the past few years a number of new malting methods have been described which incorporate different systems for embryo inactivation. These include:—

The use of dilute sulphuric acid in the steep, now the subject of an International patent (Luchsinger and Flechenstein 1960).

The use of acetic acid in the steep, which restricts rootlet growth but not the growth of the young shoot (Kirsop 1964).

Freezing the grain (24 hours at 5°F) after a short period of steeping and then continuing the

steep until the required moisture is achieved (Smith *et al*, 1964).

Steeping the grain in hot water (24 hours at 104°F) which both inactivates the embryo and reduces the steeping time. (Pool 1964).

There is, however, another method of grain treatment which, whilst not completely inactivating the embryo, does have other advantages.

It was mentioned above that the enhanced effectiveness of gibberellic acid on embryo-excised grain could be due to greater oxygen availability at the aleurone layer. This led to the idea that it might be possible to increase the oxygen availability at the aleurone layer of normal grain by rupturing the pericarp-testa and the husk by a light crushing to produce hair-line fractures. It was also thought that this might speed the entry of the applied gibberellic acid to its site of action. It is already known (Collins 1918) that water and solutes enter the grain only at or near the micropyle, at least in the early stages of germination.

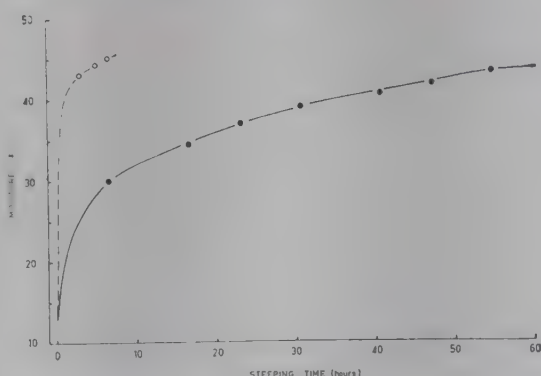


FIGURE 3
Water Uptake Rates of Grain Steeped at 50°F.
O — Intact grain
● — Crushed grain

The most immediate result of grain crushing was that it shortened the steeping time required to bring the grain to a moisture content of 44 per cent. In this sample (Figure 3), from 59 hours in intact grain to 4½ hours in crushed grain. In addition, at the conclusion of the steeping period the embryo of the crushed grain contained 52 per cent

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moisture as opposed to 60 per cent in intact grain. This reduced moisture content apparently retarded embryo activity throughout malting. The expected enhancement of gibberellic acid stimulation also occurred so that the benefits from crushing are three fold:—

- a reduced steep time;
- a reduced malting loss, and
- an increased extract.

This is illustrated in Table I.

With intact grain without gibberellic acid treatment a steeping of 2½ days followed by 6 days germination resulted in a 77.8 per cent extract. Taking account of the malting loss this amounts to a 70.2 per cent extract on the basis of the original dry weight of barley. Gibberellic acid treatment reduced the germination time by 2 days with only a slight reduction in extract from the malt, but with an increase

a revolutionary change as a result of the impact of scientific investigation of its problems.

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TABLE I
A Comparison of Processing Time and Malt Analyses of Intact and Crushed Grain Treated with Water or Gibberellic Acid.

GA ₃ * Concentration (ppm)		Intact Grain		Crushed Grain	
		0	1.0	0.1	1.0
Steeping	(Days)	2.5	2.5	0.2	0.2
Germination	(Days)	6.0	4.0	4.0	4.0
Total Processing Time (Excluding Kilning)	(Days)	8.5	6.5	4.2	4.2
Hot Water Extract (Dry Malt Basis)	(%)	77.8	75.9	76.4	80.0
Total Soluble Nitrogen	(%)	0.537	0.619	0.652	0.771
Malting Loss	(%)	9.8	6.0	5.8	4.6
Hot Water Extract (Dry Barley Basis)	(%)	70.2	71.3	72.0	76.3

*Gibberellic Acid

in extract from the barley. Crushing of the grain reduced the steeping time and enhanced the effectiveness of the gibberellic acid treatment, such that a 0.1 ppm solution gave an increase in extract over a 1.0 ppm solution in intact grain.

Details of this work on crushing and gibberellic acid treatment have only recently been submitted for publication and have not yet been put to a practical commercial test. But it is obvious from the foregoing remarks that malting is undergoing

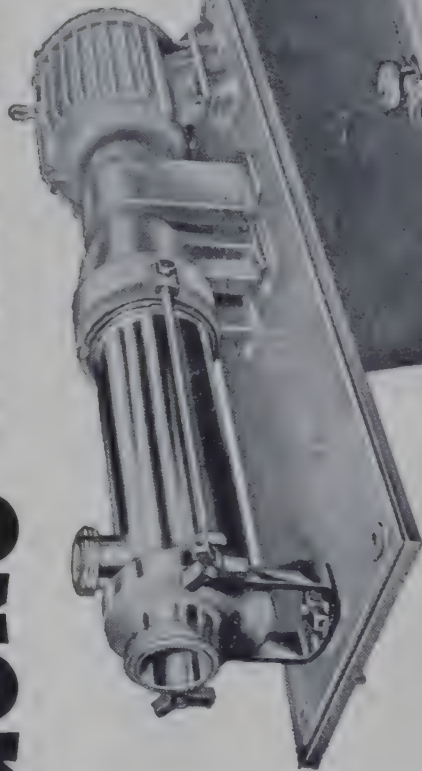
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Milk Powders For Recombined Dairy Products

By L. L. MULLER,
C.S.I.R.O., Division of Dairy Research, Highett, Vic.

(Continued from Vol. 17, No. 10, Page 571)

POWDER FOR RECOMBINED SWEETENED CONDENSED MILK

A major quality factor in sweetened condensed milk is its viscosity and its rate of thickening on ageing. In conventional plants it is known that reasonable uniformity in these properties can be achieved through adjustment with season of the preheating before condensing the milk.

Preliminary experiments were conducted in 1962-63 to determine the influence of the preheating of skim milk before spray drying on the viscosity characteristics of recombined sweetened condensed milk. These results were published (Lawrence, A. J., *et al*, 1963) and need only be summarized here. Comparison was made between low, medium and high heat powders (W.P.N. Indices respectively 7.7, 3.4 and 1.2 mg/g) produced by one Victorian factory in the November-December period. Equal mixtures of low and high heat powders were included in the series. The condensed milk was made in each case after homogenizing at 100 lb/sq. in. (low pressure) or 300 lb/sq. in. (high pressure). The product was stored at 40°C, 30°C and 20°C at which temperatures viscosity development is approximately equivalent after 7-14 days, 2-3 months and 4-6 months respectively.

The results at 40°C illustrated the general trend. The low heat powder

either alone or as 50% of a mixture with high heat powder tended to give a product too low in viscosity, initially and after age thickening. The 50:50 blend at the higher homogenization pressure was closer to requirements. High-heat powder at either pressure gave too rapid age thickening. Medium-heat powder at low pressure gave too low a viscosity at each stage. At the higher homogenization pressure the medium-heat powder behaved well.

It was, of course, realized that these findings applied only to one factory at a particular time of the year and a survey was made of milk powders made by various factories in the period March-April, 1964. By this time pilot-scale facilities had been installed at Highett for manufacture of recombined sweetened condensed milk. This equipment had been designed to reproduce as nearly as possible the conditions in the full scale plants then being installed in Singapore and Bangkok. It was possible therefore to apply to the powders in the survey the ultimate test of observing their behaviour under manufacturing conditions.

Figure III shows the relationship between the viscosity of the sweetened condensed milk so made and the W.P.N. indices for the powders.

An address to the Winter School on the Spray Drying of Milk, The University of New South Wales, 17-21 May, 1965.

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The relationship was generally good but closer study of some of the apparent deviations from the trend indicated differences between factories and districts in the optimum W.P.N. index.

LABORATORY TEST

Pilot scale evaluation of powder suitability, while the best method,

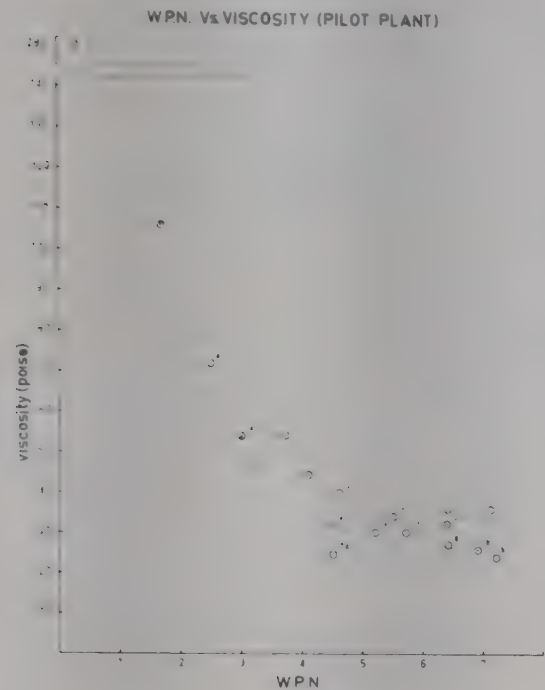


FIG. III

is too time consuming and costly to be used for routine checking of powders. For this purpose a laboratory test has been devised which aims to simulate the manufacturing conditions for recombined sweet-

ened condensed milk. The main difference is that composition has been adjusted to use only 2% of butterfat: The test briefly is:—

- Powder 150 g
- Sugar 282 g
- Fat 12 g
- Water 156 g

Add powder slowly to water at 110°F while stirring add sugar at 110°F, heat to 120°F, add molten butterfat and stir for 3 min. Heat in boiling water to 170°F and hold 2 minutes.

Cool to 90°F, seed with lactose, cool to 80°F, place in can and apply vacuum for 10 min.

Incubate at 40°C for 18 hours. Open can from base to avoid air. Determine viscosity at 25°C.

The test should be carried out promptly and be completed within 30-40 minutes otherwise high values will result.

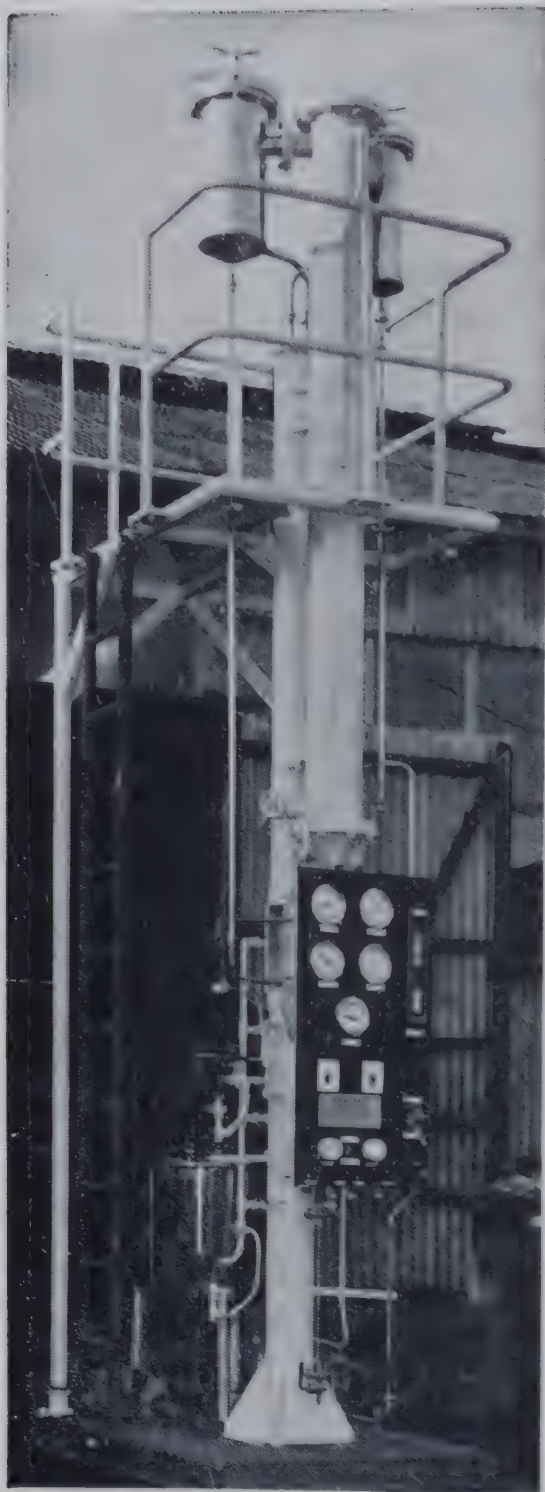
This test gives viscosity results which correspond fairly well to the viscosity of the same powder made into sweetened condensed milk on pilot or commercial scale, although the viscosities tend to be a little higher in the laboratory test.

SEASONAL VARIATION

The laboratory test with periodic checking of results has been used now on over 300 samples of powder representing trials to establish correct preheating conditions in a par-

TABLE II
PREHEATING CONDITIONS AND W.P.N. VALUES CORRESPONDING WITH
SUITABLE LABORATORY TESTS

Period	Preheating		W.P.N. (mg/g)	Viscosity (poise)
	Temp. (°F)	Time (min.)		
March, 1964	172	10	6.4	28
April	180	5	6.0	37
June	180	12	6.9	43
July	174	12	5.3	33
September	170	5	4.3	41
October	172	5	3.6	39
November	172	5	4.0	36
December	174	5	4.2	34
January, 1965	175	5	3.7	31
February	177	5	3.0	41



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ticular factory at varying stages of the season, or samples from production batches on offer to the recombining plants. From this work a picture is emerging of the variations in treatment necessary to give good uniformity in the behaviour of the powders in recombining.

Table II above illustrates the seasonal change in one of the factories supplying this powder.

The changes shown in the table are quite marked. In the late autumn and early winter fairly severe preheating still gave a W.P.N. value so high that the powders could have been classed as *low heat*. As the season advanced less severe time-temperature combina-

the table above were obtained on a batch manufactured on the 3rd. Table III shows some other figures in that month for the same factory during adjustment of conditions to correct a tendency for the laboratory test viscosities to fall.

It will be seen that a change of only 4°F substantially reduced the W.P.N. value and increased the viscosity in the laboratory to quite a high value. This change needed was only about 2°F.

One feature which clearly emerges from the results is that it is impossible to specify a narrow range of W.P.N. values which will give powders suitable for recombined sweetened condensed milk. The

TABLE III

Date	Preheating		W.P.N. (mg/g)	Viscosity (poise)
	Temp. (°F)	Time (min.)		
8/1/65	175	5	3.5	28
15/1/65	179	5	1.7	90
26/1/65	177	5	2.7	29

tions gave much lower W.P.N. values. In the summer months it was necessary to increase somewhat the preheating temperature — giving some further reduction in W.P.N. value — to maintain a satisfactory viscosity in the laboratory test. Results from other factories have shown an equally marked seasonal change but did not necessarily follow the same trend in detail. The preheating conditions stated in the table also did not necessarily correspond to those required in another factory to give the same result. It is not certain how much of this between factory difference is due to the milk and how much due to processing conditions and equipment — the latter are certainly important.

At all times accurate control of preheating and holding conditions is essential to achieve good uniformity from day to day with these laboratory tests. This is especially so at certain times of the year. The figures quoted for January, 1965, in

W.P.N. value is, however, a good guide to uniformity of treatment over a limited period of time in one factory and, used in conjunction with the laboratory test, gives a good picture of the expected behaviour of the powders in the sweetened condensed milk plants. Practical experience in the plants has confirmed the earlier information on correspondence between laboratory test data and actual performance.

IMPORTANCE OF VISCOSITY

The reasons for seeking such close control of the preheating given to powders for recombined sweetened condensed milk become very apparent with some experience of the process. The aim in a recombining process is to achieve maximum economy by avoiding costly evaporation of water. This is possible in the process used in Singapore and Bangkok where the mix is prepared at about 72.5% solids, homogenized and pasteurized at



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this concentration, the only evaporation of water being in the vacuum coolers where the reduction of temperature from about 120°F to 65°F is accompanied by an increase in solids concentration to about 74.5%. This means that the viscosity is fairly high during processing, the most noticeable effect being on the back pressure created in the plate heat exchanger used for pasteurization. With normal powders this pressure

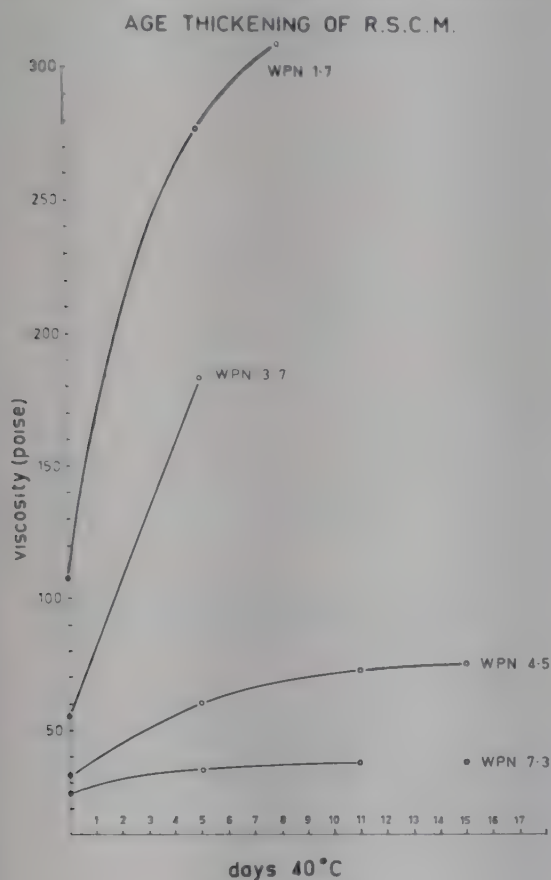


FIG. IV

is 30-40 lb/sq. in. With an over-heated powder the pressure can become dangerously high and in extreme cases coagulation of milk proteins can completely block the heat exchanger.

Apart from the processing difficulties with varying viscosity the important quality factor of age thickening is involved. Figure IV shows this effect. It can be seen that the rate of age thickening is a function of the initial viscosity and can therefore be controlled by careful attention to viscosity from the start.

It would be very difficult to obtain powders completely uniform in their viscosity characteristics. Fortunately it has been found that reasonable variability can be accommodated by blending different powders. An extreme example of the benefits of blending is shown in Table IV.

This factor is taken into consideration in using the powders supplied to Singapore and Bangkok. A blend is regularly used, the blend being decided on analytical data on different powder batches. This way

TABLE IV

Results of blending of two powders on viscosity of recombined sweetened condensed milk

Powder	Viscosity (poise)	
	Initial	After 10 days at 40°C
100% - A	24	48
20% - B; 80% - A	35	50
40% - B; 60% - A	42	81
60% - B; 40% - A	44	105
100% - B	280	450

very good control of initial viscosity and the rate of age thickening is achieved.

OTHER FACTORS

While selection of powders for recombined sweetened condensed milk on the lines above has generally solved the practical problems of this recombining operation there remain at least two other factors relating to behaviour of powder on which the information available as yet is by no means sufficient.

The first of these arose from observations on a consignment of powder received in Singapore from one factory. This powder was tested in a trial commercial batch and caused considerable difficulty with blockage of heat exchangers. The W.P.N. value and laboratory test appeared normal and no evidence could be found in the laboratory of undue sensitivity to heat. The only abnormal feature of the powder evident in the analyses was a higher-than-



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normal solubility index. The A.D.M.I. specification of a solubility index not exceeding 1.25 ml had been used for these powders. Generally the index of other powders was only about 0.1 ml. This powder had an index around 0.7 ml. This is still within the A.D.M.I. standards but it must be borne in mind that this specification covers all types of powders including very strongly heated powders for bread making.

The suggestion which we intend to explore is that the insoluble particles in this powder represented a percentage of overheated particles, arising perhaps from filter bags or through bad design of the holding section used for preheating the milk. It seems possible that this fraction might behave like a high heat powder when the sweetened condensed milk was treated in heat exchangers. If the fraction represented a substantial percentage of the powder the blockage of heat exchangers experienced might be explainable. The effect of blending illustrated above would account for the laboratory test being normal.

Until further information on this problem has been obtained factories are being asked to pay particular attention to solubility and the Dairy Board is seeking powders with a solubility index not exceeding 0.2 ml.

The second factor associated with powder concerns its effect on the colour of the sweetened condensed milk. So far most of the powders have been obtained in Victoria and the colour of the resulting milk has been uniformly good. However it has been found that powder from one Queensland factory gives a milk with a darker colour initially and one in which the darkening on ageing proceeds more rapidly than normal. Time has not yet permitted investigation of the reasons for this or whether the effect is a geographical one or due to some unusual practice in the particular factory.

POWDER FOR FLUID RECOMBINED MILK

Pasteurized

Where skim milk powder is required for recombination as pasteurized fluid milk the aim is to produce a powder in which practically no flavour changes due to processing are evident.

The industry in Australia has already had some experience in this field and a number of factories are able to produce a high quality low-heat powder. Perhaps the major difficulty with a low-heat powder is the achievement of satisfactory bacteriological results. Before the purchasing of powders for Manila began, the Australian Dairy Produce Board arranged for a survey of the chemical and bacteriological quality of powders from most Australian factories as a preliminary to setting quality standards.

The samples generally complied well with the tentative standards set except in the case of the bacteriological results with low-heat powders. Of the samples with W.P.N. values of 6.0 mgm/g or over — indicative of low-heat powders — over 50% had bacteriological results in excess of the tentative standard of 50,000 per g. It was realized, of course, that determination of bacterial numbers in a milk powder is not a very accurate or reliable procedure. However it was evident that more attention to this factor in quality is required by some factories. Obvious points to watch would be the initial milk quality, the conditions of storage of milk before and after separation and the standard of hygiene throughout the process. The fact that the remaining samples complied with the standard showed that the task is well within the capabilities of a good dairy factory.

Sterilized

The manufacture of recombined sterilized milk is a relatively new development and there has been little opportunity as yet to exam-

ine the powder characteristics required. Some information from overseas suggests that heat stability may be a problem although probably not of the same significance as with powder for evaporated milk because of the much lower concentration. The developments in ultra-high-temperature sterilization followed by aseptic packaging — aimed to give the minimum processing flavour could lead to an interesting problem in providing suitable powder which combines adequate heat stability with best flavour.

REFERENCES:

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Rose, D. (1964) — "J. Dairy Sci.", 47, 1047.
Lawrence, A. J., Muller, L. L. and Rogers, W. P. (1963) — "Aust. J. Dairy Tech.", 18, 189.

Personal . . .

Dr. J. K. Palmer has been appointed to the Division of Food Preservation where he will study the ripening of fruit and its behaviour during storage. Dr. Palmer graduated B.S. from Juniata College in 1948, M.S. from Pennsylvania State University in 1950, and Ph.D. from the same University in 1953. From 1952 to 1956 he worked at the Connecticut Agricultural Experiment Station and from 1956 to 1959 at the Virginia Institute for Scientific Research. For the last six years he has been Senior Biochemist in the Central Research Laboratory of the United Fruit Company.

Dr. N. S. Scott has been appointed to the staff of the Plant Physiology Unit, Division of Food Preservation. Since graduating in agricultural science from the University of Adelaide in 1961 he has been working for his Ph.D degree at the Waite Institute.

M. K. R. Bootle has been appointed to the Division of Fisheries and

Oceanography where he will be responsible for the editing of scientific papers and the preparation of technical reports. Mr. Bootle graduated B.Sc. from the University of Sydney in 1945. For the last fifteen years he has been with the Forestry Commission of New South Wales, firstly as a country liaison officer, and then as utilization officer in the division of wood technology.

NEW TERMINOLOGY FOR GLUCOSE

The British Glucose Manufacturers' Association* announce that as from January 1, 1965, a new standard nomenclature has been adopted by its members so that in future liquid products of the hydrolysis of edible starch will be known as glucose syrup, and the single sugar produced by complete hydrolysis will be described as dextrose (d-glucose). A booklet has been published by the B.G.M.A. to explain the reasons for this terminology.

In the past, a variety of names was used for these glucose products: glucose syrup has been known as liquid glucose, corn syrup, confectioners' glucose, glucose, starch hydrolysate and even C.S.U. (corn syrup unmixed); and dextrose has been called glucose, dextrose and grape sugar. The new terms — which have been endorsed by the Ministry of Food — will end this confusion and assist public health authorities, manufacturers and consumers to identify these ingredients in food products.

*8 Frederick's Place, Old Jewry, London, EC2.

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DD-756

BOOK REVIEWS

- "DEVELOPMENTS IN HANDLING AND PROCESSING FISH", by G. H. O. BURGESS. 132 pages. *Fishing News (Books) Ltd., London.* 1965. £15.0.

This book is one of a series of the Buckland Foundation which provides a permanent record of annual lectures maintained by a bequest of the late Frank Buckland, and is incorporated in the series The Fisherman's Library. As such it takes its place amongst an increasing number of volumes devoted to various aspects of the British fishing industry.

This particular volume is devoted to the historical developments of some of the modern methods of handling and processing fish in Britain, and to the technological problems that currently face that industry. The author, formerly of Torry Research Station and currently in charge of the Humber Laboratory, has skilfully blended fishery science with fishery history to produce a most lucid and interesting text. At times light and whimsical, it nevertheless stresses the necessary application of science to the problems of fish handling and processing.

Chapter 1 is devoted to the history and growth of the modern industry; the causes, measurement and control of fish spoilage, and problems and possible improvements in current methods. Chapter 2 considers the traditional methods of drying, curing and smoking, and Chapter 3 refers to the current and likely future of the frozen fish industry. It is interesting to note that the author considers the industry to be passing through a second industrial revolution and can see a new and modern industry emerging in the foreseeable future. That this is so is a tribute to the fine work of

the various British fishery research laboratories.

Whilst this book is largely written for the market operator and those involved with fish preparation and distribution, it contains much of interest to students of food science. The book presentation is modest, but quite adequate.

*Reviewer: Dr. R. A. Edwards,
The University of New South
Wales, Sydney.*

- "FOOD SCIENCE AND TECHNOLOGY", by MAGNUS PYKE. 211 pages. *John Murray, London,* 1964. £2.11.0.

Dr. Magnus Pyke is an English nutritionist who has established a reputation for lucid exposition of scientific subjects as a writer and broadcaster. In this book he has undertaken to tell "administrators, businessmen, manufacturers, social workers, economists, food producers, responsible citizens and students" what food science and technology are about. Assuming no scientific knowledge among these potential readers he commences with a chapter on modern conceptions of chemistry, physics, and biology and this is a surprisingly successful treatment in 20 pages.

The major part of the book is entitled "Practical Technology" and covers the principal groups of processed foods: cereals; meat, fish and poultry; milk, cheese, and eggs; fats and oils; fruit and vegetables. This material is smoothly and economically written and is generally accurate and up-to-date when allowance is made for extreme brevity. The copious illustrations are well-produced, and well-chosen to give the reader a favourable but not exaggerated picture of efficiency,



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Two final chapters under the heading "*The Training and Employment of Food Technologists*" range widely from education in food technology to new foods for new populations. Looking ahead at the developments in food technology during the next 40 years, Dr. Pyke predicts an accelerating trend towards more sophisticated convenience foods but foresees also that increasing leisure as a result of automation may lead to a renaissance of home cooking as a hobby.

While this book is eminently readable it is difficult to know to whom it should be recommended. The treatment is rather too brief and superficial to satisfy serious students of food science and technology but it would be a very useful medium to give dietitians and home economists an introduction to this field. It would be a fine thing, moreover, if even a few intelligent citizens could be persuaded to sit down and read it, since in the words of Professor John Hawthorn's foreword "— *no man can claim to be truly civilized who knows nothing of this subject*".

Reviewer: J. F. Kefford,
C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W.

•
✓ • "*MICROBIOLOGICAL METHODS*", by C. H. COLLINS. (*Laboratory Techniques Series*.) 330 pages. Butterworth and Co. (Publishers) Ltd., London. 1964. £3.15.0.

This book is well-planned, concise and pleasant to read and embodies the knowledge of a microbiologist with considerable experience in handling a wide variety of practical problems. This experience has been used to select and describe methods of personal choice that are simple and do work. The text, therefore, is not cluttered with descriptions of the many alternative methods.

It should prove of considerable value to workers in many kinds of laboratories particularly the inexperienced microbiologist who is working alone. It has been written to satisfy the growing need for a book of practical methods in microbiology for technology and university students. It claims justly to be a bench book suitable for public health, food and medical laboratories.

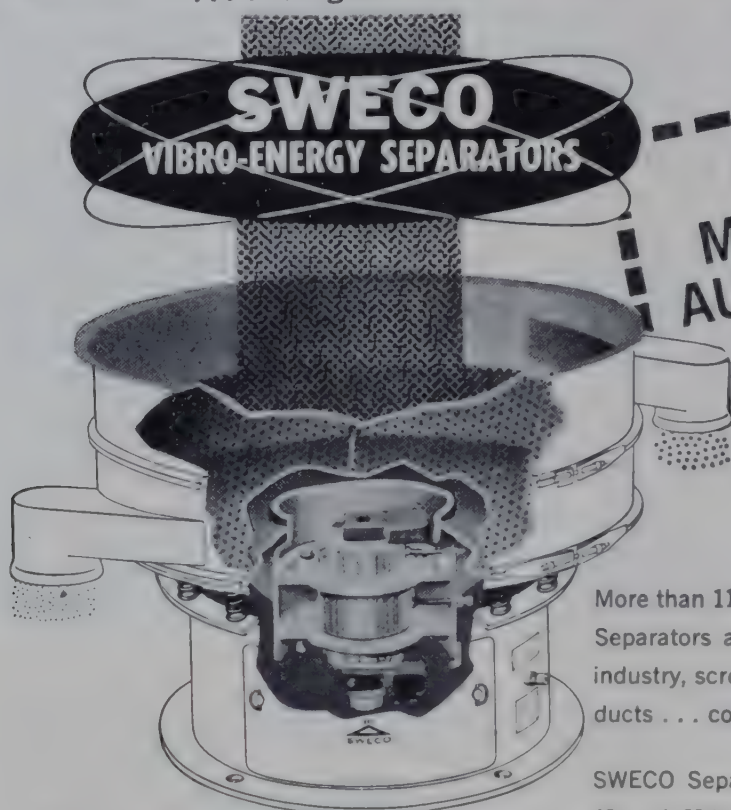
Part I gives a clear, concise, general introduction to the biology of micro-organisms, their classification and the principles of serological identification. Part II covers apparatus, sterilization procedures, microscopy, cultural methods, biochemical identification tests, counting methods and agglutination tests. In addition, this part includes methods of media preparation and a very useful selection of media for growing pathogens, food poisoning and spoilage organisms. These chapters will be valuable to food processors setting up small control laboratories. Part III describes the practical identification of the main groups of organisms. Some may criticize the groupings and classification systems adopted, but this cannot reduce the value of this section for the practical identification of organisms, especially when due regard is given to the problems in classification.

Part IV comprises methods of applied microbiology for examination of water, foods (including canned foods), assay of antibiotics, testing of antibacterial substances, investigation of food poisoning outbreaks and a very brief mention of microbiological standards in the various products and safety in the microbiological laboratory. The section on food microbiology would benefit from some expansion. In particular, details and discussion of existing microbiological standards would be helpful.

Reviewer: Dr. W. G. Murrell,
C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W.

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Council of Australian Food Technology Associations Incorporated

1965 CONFERENCE

Reports submitted to the Conference
held at Terrigal, N.S.W., on May 24-26, 1965

The Conference Minutes appeared in the
October issue of this Journal.

APPENDIX A

PRESIDENTIAL REPORT

Gentlemen,

It gives me great pleasure indeed to submit the fifteenth and sixteenth Annual Reports of the Council of Australian Food Technology Associations Incorporated.

Once again the reports cover a period of two years, a circumstance which we sincerely hope will be corrected in the future. It is extremely difficult, if not impossible, to analyze critically the events with which one has been closely associated and this certainly applies to the work undertaken by the C.A.F.T.A. Executive over the preceding two years.

I would dearly like to report that it was a very successful two years, but, alas, this is not strictly true.

THE C.A.F.T.A. IMAGE:

You must excuse me using an advertiser's terminology in a technologists report but our biggest single problem is our lack of finance and this in turn stems from the fact that the C.A.F.T.A. work is undervalued and it is undervalued by the food industry whose interests it pursues; not by the various Commonwealth and State Departments

with which it deals. C.A.F.T.A.'s most pressing aim is to change this state of affairs and to raise our status within our own industry.

We are improving. It has been amusing over the last two years, to find some of the *Commercial Associations* run by the industry leaders, being referred back to C.A.F.T.A. by a Government Department. They were almost surprised that such an organization as C.A.F.T.A. existed. How we can increase our stature still more within our industries needs a great deal of consideration by future Executives.

FINANCE:

As the Treasurer's Report will indicate, our finances, although not healthy, are in credit and provided we are prepared to accept a biennial conference, it is expected that they will remain so over the next two years. An Annual Conference as run at present would require an annual increase in fees in the order of £3/-/- per member company and I am not brave enough to suggest it at this juncture.

CODEX ALIMENTARIUS:

At the Glenelg Conference it was decided that C.A.F.T.A. should make

every endeavour to participate in the decisions of the newly formed international Codex Alimentarius Commission. On the advice of Professor Reuter, correspondence was forwarded to the Department of Primary Industry in Canberra indicating our desire to voice the Australian Food Industry's opinion on draft regulations, offered to the Codex Commission.

After many letters and a couple of personal approaches to the Secretary of the said Department, it was agreed that where no other national body within the Food Industry was available to correlate the food industry's views, then C.A.F.T.A. would act as the co-ordinating body. To date, this has indeed been the case.

"FOOD TECHNOLOGY IN AUSTRALIA":

I take the opportunity of congratulating the Committee and particularly the Editor, Professor Reuter on publishing a journal that is accepted so well by the industry. However, it is to be hoped that the proposed formation of the Australian Institute of Food Science and Technology will give the Journal an even greater value as the food industry's leading technical journal.

STATE F.T.A.'s:

To us in Brisbane studying the monthly State Management Committee reports, it was obvious that we were blessed with enthusiastic State Associations. There appeared to be a real desire to get things moving. This was not only evident in the drive for greater membership (and there is still plenty of scope for improvement in this field) but also in an earnest endeavour to give more members an active participation in the affairs of the local State F.T.A.'s. The latter approach is often overlooked and we may wonder why some member companies become dissatisfied when their only contact with the Associa-

tion is the Annual Account. Perhaps this can be one of our aims for the new fiscal year.

However, I am most sincere when I thank the six State Management Committees for the way they have conducted their affairs during the last 24 months.

PUBLIC RELATIONS BROCHURE:

Our Western Australia friends have completed this project most successfully and I must congratulate them on their effort. It is now up to us to make sure that these brochures are used to their full advantage.

TECHNICAL STANDING COMMITTEE:

A President's report is never complete without a mention of the work done by the Technical Standing Committee. While the Federal Executive may be the co-ordinating body of C.A.F.T.A., the activities undoubtedly centre around the T.S.C. I am sure that you will all agree with me when I express my sincere appreciation to Mr. Norman Rodd and his merry men and to Mr. Bob Fisher for a job well done.

OUR DELEGATES:

At each conference it is our privilege to elect a number of delegates to the various Government Sub-Committees with which C.A.F.T.A. is associated. We have been more than satisfied with our representatives as they have always put service above self, giving many hours of their own time for the good of the food industry.

WEIGHTS AND MEASURES LEGISLATION:

The investigation into rationalization of Weights and Measures Regulations by Mr. Cuthill of Victoria, has already brought proposals for consideration by Government and Industry.

Like Pure Food Laws weights and measures are strictly a State matter and although co-ordination can be undertaken by the Commonwealth, it is the State that has the final say. However, unlike Pure Food Laws, weights and measures encompass more than the Food Industry, even though it is probable that our industry will be most effected.

Now the regulations, as initially proposed, are nowhere near as harsh or widespread as feared but it is almost certain that this is just a start. It is therefore absolutely imperative that industry generally and the food industry in particular, must have a preview of any change in the regulations before they be-

come law. Whether the Commonwealth Government will set up a Committee with Government and Industry representatives or whether this is to be done on a State level, is a matter for the future. But done it must be!

Anticipating the motion proposed by New South Wales as an agenda item I took the liberty of writing to Senator Gorton suggesting that a body be set up similar to C.A.F.T.A. or alternatively that C.A.F.T.A. be the co-ordinating body. I hope that this Conference urges the incoming Executive to press this matter to the full.

(Signed) *NEIL M. GOW,*
President

APPENDIX B

Report of the C.A.F.T.A. Nominees on the N.H. & M.R.C. Food Standards Committee

MEMBERSHIP:

Professor F. H. Reuter (Chairman), Dr. D. B. Travers (Deputy Chairman and Convener), W. R. Jewell, K. F. Kefford, W. H. Kelly, J. G. Krigsman, D. Kruger, Dr. V. M. Lewis, Dr. R. C. McCarthy, W. Madwick, E. S. Ogg, I. H. Smith, L. N. Thornton, J. P. Warry.

During the period since the last Conference, six meetings of the N.H. & M.R.C. Food Standards Committee were held. Each meeting was of two full days duration.

Details from the reports of the Food Standards Committee have been published regularly in "*Food Technology in Australia*", and the details of the work achieved by the Committee is available in other documents.

The Committee has acted very harmoniously and the utmost consideration has been given at all times to submissions by the Industry Representatives. All draft stand-

ards submitted by C.A.F.T.A. are very thoroughly examined, and when there is basic disagreement on any point, an opportunity is always afforded Industry to make further comment; or in extreme cases, a section of industry has been invited to send a personal delegation to make their case.

The representative States on the Committee are now co-operating most conscientiously with the Committee and it is only in rare circumstances that unilateral action has been taken on an amendment to the food regulations in any State.

During the period covered by the Report there has been some difficulty caused by lack of suitable definition of the functions of the F.S.C. and the F.A.C. These differences have now, for the most part, been eliminated by rulings of the N.H. & M.R.C., but there are still minor cases of confusion in functions of the two Committees.

There has been some criticism of some of the Standards which have been finalized by sections of Industry both within and outside the F.T.A. organizations. In commenting on these criticisms the following points should be borne in mind:—

1. Industry representation on the Committee is only a very minor one so far as numerical strength is concerned.

2. In very many instances, draft standards are not adequately studied nor are comments received in many cases until a Standard has been finalized. It is a difficult and lengthy matter to have a standard altered once it has been approved by the N.H. & M.R.C. and sent to States for adoption.

3. Some instances have occurred where sections of Industry outside C.A.F.T.A. have complained of lack of representation on the Committee. The Committee thus far has restricted Industry representation to C.A.F.T.A., but C.A.F.T.A. has been asked to make their enquiries to cover as broad a section of industry as possible. This, to the best of our knowledge, has been done. However there is basis for considerable expansion of F.T.A. membership in some industries as a direct F.T.A. link with as many individual firms as possible is highly desirable.

4. In order to achieve uniformity there must in some instances be a measure of compromise, and industry should be willing to accept compromise in these cases. The F.S.C. is always prepared to receive recommendations from industry

where new information is available to support changes in the Regulations ever after a final Standard has been adopted. However, where a section of industry endeavours to exert pressure at State Government level to amend some aspects of a Uniform Standard in that State, they may be doing considerable harm to Industry as a whole by casting doubt in the minds of Commonwealth and State Authorities on the desire of Industry for uniformity. Such unilateral action can possibly forfeit advantages gained by other sections of the Industry in relation to a specific regulation.

At the most recent meeting of the F.S.C. the Public Health Committee made known its decision to block consideration by the F.S.C. of a proposed Standard until the opinion of State Health Authorities was ascertained as to the need for such a Standard. The F.S.C. is opposed to this procedure which would very considerably hamper its operations and has given the Public Health Committee detailed reasons for its objection. Should the P.H.C. insist on the procedure, the matter could well be taken up by C.A.F.T.A. at the highest level.

The question of declaration of food additives on the label is at present being reconsidered and the F.S.C. has referred this subject to the Food Additives Committee.

It may be necessary for C.A.F.T.A. to express definite views on this matter in the near future.

(Signed)

J. G. KRIGSMAN,
V. M. LEWIS

APPENDIX C

Report of the C.A.F.T.A. Nominees on the Food Additives Committee of N.H. & M.R.C.

Since the last C.A.F.T.A. Conference, four meetings of the F.A.C. have been held, one in Canberra and three in Sydney.

The August 1963 and February 1964 meetings were under the chairmanship of Dr. A. Johnson but upon his transfer to Western Australia, Dr.

C. W. Phillips and then Dr. D. B. Travers acted as chairman. Membership of the committee is now as follows:—

Dr. D. B. Travers, Chairman and Convener (N.H. & M.R.C., Canberra), Dr. R. A. Bottomley, Vice-president, Research (Mauri Brothers and Thomson Ltd., Sydney), Dr. C. E. Cook (Medical consultant, Sydney), Dr. I. S. de la Lande (University of Adelaide), Dr. K. T. H. Farrer (Research Manager, Kraft Foods Ltd., Melbourne), Dr. P. E. Hughes (Department of Pathology, University of Melbourne), W. K. Jewell (Consultant chemist, Melbourne), E. S. Ogg (Government Analyst, Dept. of Public Health, Sydney), Professor F. H. Reuter (Department of Food Technology, University of N.S.W., Sydney), Dr. J. R. Vickery (Chief, C.S.I.R.O. Division of Food Preservation, Sydney), J. P. Warry (Technical Secretary, N.H. & M.R.C., Canberra), Professor S. E. Wright (Professor of Pharmacy, University of Sydney).

The terms of reference of the committee are, *"To enquire into and advise Council through the Public Health Advisory Committee on additives, chemical contaminants and dye stuffs in food for human consumption"*.

Because of these terms, and the volume of business to be considered by Council, there is necessarily a delay between making any F.A.C. recommendation and the publication of Council's report of the meeting at which it was considered.

This will be seen from the following tabulation:—

F.A.C. Meeting	Council Meeting	Date Council's Report Received by Writer
August, 1963	October, 1963	March 23, 1964
February, 1964	May, 1964	October 23, 1964
August, 1964	October, 1964	February 16, 1965
February, 1965	May, 1965	

However, administrative action in respect to F.A.C. recommendations may be instituted immediately after Council's meeting and is not dependent upon the appearance of its report.

The work of the F.A.C. is widespread and three sub-committees exist to study specialized aspects, viz., Food Irradiation, Food and Cosmetics Colours and Pesticide Residues in Food.

During the past two years the Food Additives Committee has examined approximately 82 agenda items. Of these only four originated from C.A.F.T.A., 46 arose directly from industry and 32 from Government or semi-Government bodies and sundry. The C.A.F.T.A. applications, which related to essences, cobalt chloride in beer, diacetyl in confectionery and benzoic acid in fishmarinades were generally accepted by the F.A.C. and Council. Of those from industry some were accepted, some rejected and some are under investigation. It is obvious that industry markedly prefers an individual approach to the Food Additives Committee rather than through F.T.A's and C.A.F.T.A.

The F.A.C.'s recommendations approved by Council were published in the reports covering the 56th, 57th and 58th Sessions and reprinted in *"Food Technology in Australia"*.

Besides considering the technical matters referred to it, the Food Additives Committee has simplified the Application form for permission to use a new additive; has prepared a list of food modifying agents which, subject to stated principles, may be included in any food standard; has re-stated the principles governing the use of food additives and has kept itself abreast of developments

in other countries and in F.A.O. and W.H.O.

The sub-committees have been active although only a relatively small number of meetings has been held. That on *"Food Irradiation"*

has continued its watching brief on developments here and overseas and has discussed the data required to evaluate the irradiation process. The Pesticides Residues in Food Sub-committee has considered a very large number of chemicals and has prepared a lengthy report which has been submitted to State Health Departments and Departments of Agriculture for comment.

The Food Colours Sub-committee has been fortunate in that one of its members, Professor S. E. Wright, attended a recent meeting of the W.H.O./F.A.O. Expert Committee on Food Colours.

(Signed)

R. A. BOTTOMLEY,

K. T. H. FARRER

APPENDIX D

Report of the C.A.F.T.A. Technical Standing Committee For 1963/65

MEMBERSHIP:

N. W. Rodd, Chairman; R. Fisher, Secretary; Dr. R. A. Edwards, D. W. Grover, W. W. Hopkins, P. Lever-Naylor, Dr. V. M. Lewis, F. Ottaway.

PREAMBLE:

In the two-year period since last Conference the T.S.C. has held 23 Meetings. Between July 1962, and November 1963, Mr. Peter Lever-Naylor of the Nestlé Company had leave of absence whilst overseas, and his place was taken during this period by Mr. John Harris, also of the Nestlé Company.

From December 1963 till February 1965, Dr. R. A. Edwards of the University of New South Wales was on leave while undertaking research overseas and his place was filled by Dr. P. M. Linklater of the University of New South Wales.

During the period under review 11 new drafts were initiated. These were:—

Tomato products,
Wine,
Dessert pudding and custard mixes and powders,
Frozen food code,
Sauces and chutneys,
Fruit (fresh and preserved),
Pastry mix and pastry,

Vinegar,
Flour and meals,
Goats milk,
Tripe.

The past two years has seen 11 drafts recommended for adoption by the F.S.C. These were:—

Pickles,
Marzipan,
Soft drinks,
Fish marinades,
Mayonnaise (referred back by N.H. & M.R.C.),
Coconut,
Confectionery,
Jams, conserves, fruit jellies, etc.
Lemon butter and fruit spread (redraft),
Butter and butter products.
Dried milks.

A comprehensive summary of the whereabouts of all drafts is attached to this report.

FOOD STANDARDS COMMITTEE:

The F.S.C. has further increased its reliance on the assistance given by C.A.F.T.A. In addition to seeking comments on, and re-drafting of, clauses of drafts originally submitted by C.A.F.T.A., the F.S.C. has sought comments from Industry through C.A.F.T.A. on the following matters:—

Dyeing of skinless frankfurters,
Use of soy protein in bread,
Refrigeration of canned hams,
Addition of non-fat milk solids to
processed cheese.

Furthermore, as a consequence
of submissions from sources other
than C.A.F.T.A., the F.S.C. has asked
C.A.F.T.A.:—

To draft regulations for:

Wine,
Spirits,
Flour and meals,
Goats milk,
Pasteurization of egg pulp,
Caviare.

To draft clauses for:—

Whipped thickened medium
cream,
Devonshire or clotted cream,
Instant coffee,
Safflower, sunflower, rape, soya,
peanut and maize oils,
Sucrose limit in honey,
Pre-cooked meat balls, hamburg-
ers or rissoles,
Meat pastes.

MEETINGS:

The Committee is grateful to
Henry Jones and Company (Sydney)
Pty. Limited, The Nestlé Company,
Food Technology Department of the
University of N.S.W., M.B.T. Re-
search Laboratories, Henry Lewis
and Sons Pty., R. K. Newman and
Co. Pty. Ltd. for placing rooms at
its disposal and for providing re-
freshments.

CODEX ALIMENTARIUS COMMISSION:

The Technical Secretariat has pro-
cessed comments and prepared re-
ports on the deliberations of the
working committees for *Sugars* and
for *Fats and Oils*.

CONCLUSION:

The committee would like to
thank the F.T.A's, and in particular
the various Technical Committees,
for their help and co-operation.

(Signed)

N. W. RODD,
Chairman.

R. FISHER,
Technical Secretary.

Draft Situation

(A) F.S.C. Draft 2 (recommended by F.S.C.
to N.H. & M.R.C. for adoption)

Antioxidants,
Artificial Sweetening Substances,
Baking Compounds,
Butter and Butter Products,
Canned Fish Products amendment re oil
content,
Canned Fish Products amendment re
canned fish balls,
Canned Fish Products amendment re de-
letion of reference to prescribed method
in clause 5(a),
Canned Meat Products amendment re
Irish Stew,
Canned Meat Products amendment re
canned meat balls,
Canned Meat Products amendment re
labelling of canned hams.
Cheese,
Cobalt in Beer (rejected by N.H. &
M.R.C.),
Cocoa and Chocolate amendment re
alkali-free in clauses 4, 5(a) and 8,
Cocoa and Chocolate amendment re
cocoa beans,
Cocoa and Chocolate amendment re
milk chocolate easter eggs,
Cocoa and Chocolate amendment re
deletion of reference to prescribed meth-
od in clause 7(b),
Coffee, amendment re deletion of pre-
scribed methods in Clauses 8 and 9,
Condensed Milk,
Confectionery,
Dietetic, Special Diet and Invalid Food,
Dried Milks,
Edible Fats and Oils,
Fish and Fish Products amendment re
fish marinades,
Flavoured Milks,
Food Additives,
Gelatine
Glucose in Jams,
Honey,
Ice Cream and Related Products amend-
ment re labelling of milk products,
Ice Cream and Related Products amend-
ment re dairy ice mix,
Ice Cream and Related Products amend-
ment re farinaceous matter in clause 6,
Jams, Conserves, Fruit Jelly, Marmalades
and Pastrycooks' or Bakers' Filling,
amendment of definitions,
Jelly Crystals and Mixes,
Lemon Butter, Fruit Flavoured Spread,
amendment restricting scope,
Lemon Butter, Fruit Flavoured Spread,
amendment re starch,
Malted Milk Powder,
Margarine, amendment re mono and di-
glyceride emulsifiers,
Margarine, amendment re vitamin re-
quirements.
Marzipan, amendment re other nut ker-
nels,
Mayonnaise and Related Products, amend-
ment re deletion of reference to pre-
scribed methods.
Meat and Meat Products, amendment of
sausage meat clause (fat and starch),
Meat and Meat Products, amendment of

- re manufactured meat, saveloys and frankfurts.
- Meat and Meat Products, amendment of re definition of meat (meat flesh).
- Meat and Meat Products, amendment of re meat pies.
- Meat and Meat Products, amendment of re typographical error (nitrate for nitrite).
- Metals in Food, amendment re sample for analysis.
- Pickles.
- Prescribed Colourings (part of Introductory Regulations).
- Preservatives, amendment re sorbic acid.
- Skim Milk, amendment re deletion of prescribed method in clause 1.
- Skim Milk, amendment re maximum fat content.
- Soft Drinks.
- Spices, Mixed Spices, Condiments, amendment re free-running agents in salt.
- Sugar and Glucose, amendment re deletion of prescribed method in clause 4.
- Sugar and Glucose, amendment re silico aluminates.
- Sulphur dioxide in Dehydrated Vegetables.
- Tea.
- Type size in labelling.
- Vitamins and Minerals, amendment for biscuits.
- Vitamins and Minerals, amendment for food labelled as Invalids' Food and for milk substitutes of vegetable origin.
- (B) F.S.C. Draft 1 Awaiting Comment by Advisory Committees:**
 - Coffee, amendment re soluble coffee.
 - Honey, amendment re sucrose limit.
 - Ice Cream, amendment re depiction of fruit.
 - Meat and Meat Products, amendment re meat balls, hamburger and rissoles.
 - Meat and Meat Products, amendment re meat paste.
- (C) F.S.C. Draft 1 Awaiting Comment by C.A.F.T.A. and/or Government Analysts**
 - Cream and Cream Products.
 - Labelling.
 - Yoghurt.

(D) Submission (not from C.A.F.T.A.) to F.S.C. Referred to Specialist Committee
Smoke Essence.

(E) Submissions (not from C.A.F.T.A.) to F.S.C. Referred to C.A.F.T.A. for Comment:

- Bread.
- Cheese, amendment re Skim Feta and re processed cheese.
- Frozen Food Regulation.
- Frozen Food Code (F.S.C. amendment of C.A.F.T.A. draft).
- Toys in food packages.

(F) Drafts Awaiting First Consideration by F.S.C.:

- Dessert, Pudding and Custard Mixes and Powders.
- Essences and Flavourings (being considered by F.A.C.).
- Fruit Juices in conc. fruit juices.
- Miscellaneous non-excisable Beverages.
- Sweetened Fruit Juices (being prepared for forwarding to F.S.C.).
- Tomato Products.

(G) Drafts Within C.A.F.T.A.'s Uniform Procedure:

- Flour and Meals.
- Fruit (fresh and preserved).
- Goats Milk.
- Pastry Mix and Pastry.
- Sauces and Chutneys.
- Tripe.
- Vinegar.
- Wine.

(H) Drafts in Course of Formulation by T.S.C.:

- Edible Fats and Oils amendment re safflower, sunflower, rape, soya, peanut and maize oils.
- Ice Cream and Related Products, amendment re continental types.
- Mayonnaise and Related Products (re-draft).
- Spirits.

APPENDIX E

Report of the C.A.F.T.A. Representatives on the Frozen Food Sub-Committee of the National Health and Medical Research Council

The current Sub-committee consists of the following:—

Dr. D. B. Travers, Chairman (Commonwealth Dept. of Health), J. P. Warry, Convener (Commonwealth Dept. of Health), Dr. J. R. Vickery (C.S.I.R.O.), R. C. Stanhope (Victorian Dept. of Public Health),

W. Madgwick (N.S.W. Dept. of Public Health), S. L. Guilfoyle (C.A.F.T.A.), R. Pryse-Jones (C.A.F.T.A.).

The first meeting was held on 4th August, 1964. At this meeting it was announced that one of the purposes of the creation of this sub-

committee was to prepare a standard for the sale, service, storage, display and transportation of frozen food for submission to the full National Health and Medical Research Council. It is intended that this standard will eventually be incorporated in the Pure Food Regulations of the Commonwealth and all States.

We are quite sure that the majority of the members of the Committee were not aware of this circumstance until the first meeting took place. Most members were of the opinion that the purpose for which this sub-committee was formed was to consider the adoption of a code of practice to be recommended for adoption to the Frozen Food Industry on the lines generally recommended by C.A.F.T.A.

At the first meeting of the sub-committee a draft as prepared by Mr. Madgwick was submitted for consideration. This draft in its original form was unacceptable in many ways and at the two subsequent meetings of the sub-committee held on 26th and 27th November 1964 and 4th and 5th February 1965, drastic amendments have been made to the original draft and further amendments are still to be made.

Progress reports of the various meetings of the sub-committee have been furnished to C.A.F.T.A.

soon after the meetings took place. The latest draft standard is that produced on the 4th and 5th February, 1965, of which a copy has already been sent to you. This draft has also been considered by the Commonwealth Quick Frozen Vegetable and Fruit Processors Association at a meeting held in Melbourne at the Victorian Chamber of Manufactures on 19th March, 1965. The Industry has raised rather strong objections to 7(a) of the current draft which permits the repacking of Frozen Food. It is considered by the Industry that this practice should be prohibited altogether, and they have requested that the matter be taken up at the next meeting of the Frozen Food sub-committee the date of which has not yet been scheduled.

The Frozen Food Industry also consider the specific definitions should be included in Clause 12 and that Clause 5 should be clarified to ensure that the term *pre-cooked* does not include frozen food that is merely blanched before processing.

Apart from the objections above mentioned the general draft appears to be acceptable by the Frozen Food Industry.

(Signed)
R. PRYSE-JONES,
S. M. L. GUILFOYLE

APPENDIX F

Report of the "Food Technology in Australia" Journal Management Committee for the Year Ended March 31, 1965

I have pleasure in submitting on behalf of the Committee a report of the activities of the journal "*Food Technology in Australia*" for the twelve months ended 31st March, 1965.

MANAGEMENT

It is pleasing to report that the publication has again been able to

show a surplus. This year it amounts to £133/13/2.

For many years now it has been possible to present to the Conferences of C.A.F.T.A. financial statements which truly reflect the manner in which this publication is received today in the food industry. The publication of periodicals is

today a competitive one. Most industries have a journal as their official organ. The fact that the food industry has one so successful in the technical sphere of food production, and that it is conducted by this organization, is a great credit to it. There are many reasons for this. Primarily, of course, it is due to the regard in which C.A.F.T.A. and its constituent Associations is held. It has the respect and confidence of industry and government and in consequence its activities are supported. Secondly credit is given to the team which is responsible for its production and in this connection reference is made to the Editor, Professor F. H. Reuter, Advertising Manager, Mr. F. R. Nicholas, and Secretary and Business Manager, Mr. S. M. Adams.

There appears to be no reason why this position should change in the foreseeable future as "*Food Technology in Australia*" is now firmly established and those who support it by way of advertising have long learnt that there is value associated with it.

EDITORIAL

Our Editor, Professor F. H. Reuter, reports that during the year under review the situation has been exactly the same as in previous years as regards the sources of copy and amount received. It is felt that the standard the Journal has attained in increasing the proportion of its editorial content to advertising has attracted additional copy of a high standard. The continuance of this policy will result in a progressive improvement in every aspect of the publication.

It is understood that the Editor's arrangements for sabbatical leave from June 1, 1965 to March 1, 1966 are nearing completion. It is pleasing to report that Dr. R. A. Edwards, Senior Lecturer, The University of N.S.W., is prepared to carry the full editorial burden during this period.

(Signed)

F. S. BRADHURST,
Chairman,
Committee of Management

APPENDIX G

Report by C.A.F.T.A. Representatives on the Commonwealth Food Specifications Committee

From June 1st, 1963 to March 31st, 1965, seven meetings (No. 76 to No. 82 inclusive) of the Commonwealth Food Specifications Committee were held.

The following specifications were considered:—

CFS 1-3-2A Flour

The revised specification was circulated in July, 1964, as CFS 1-3-2A, 2nd December, 1963.

CFS 1-4-6A Rice

This specification has been revised to include both long grained and short grained rice. The percentage of broken kernels permitted has been reduced to 10 per cent for short grained and 5 per cent for long grained rice.

A related documents clause has been inserted. The specification for 4-gallon tinplate containers has been revised.

CFS 2-3-1A Egg, Dried

This specification has been revised as follows:—

(i) The related documents clause will now include a reference for fibreboard containers.

(ii) The pasteurization requirement in clause 9 has been altered to 148°F for 2½ minutes.

(iii) Clause 10(b) has been deleted.

(iv) Clause 11 now reads — "Egg, Dried shall have a uniform yellow colour and a smooth and uniform texture, shall be free from gritty material, and, on reconstitution, shall be free from unpleasant off-flavours".

(v) The gas packing requirement now reads — "The free space in the container shall not contain more than two parts per centum of oxygen".

CFS 2-3-2A Eggs (in Shell)

This specification was redrafted based on the Export (dairy Produce) Regulations, the revised specification was circulated in July, 1964.

The new specification is CFS 2-3-2A, 2nd December, 1963.

CFS 4-2-9 Pineapple Juice, Canned — Initial

This is a new specification drawn up to cover the requirements of the Department of the Army.

The specification covers natural juice to which cane sugar may be added to give a Brix of 13-14 degrees.

CFS 5-6-2B Beef, Bone In (for the Australian Military Forces) 5-6-2A/1

This specification was revised, CFS 5-6-2A/1, 1st November, 1963, to delete reference to cow beef and to revise clause 14. This amendment was circulated in July, 1964.

A further revision was made, CFS 5-6-2B, to include Yearling Beef — 201-400 pounds in the specification.

CFS 5-6-3A/1 Beef, Bone-out, Frozen

This specification was amended to delete reference to cow beef, the amendment was circulated in July, 1964.

CFS 5-6-11A Mutton, Frozen (Jhatka and Halal Killed)

This specification was revised, the main alterations being in the specifications for branding of carcasses and wrappers.

CFS 5-6-15B Rabbits, Skinned

This specification was redrafted to include:—

- (i) A related documents clause.
- (ii) A clause setting out details for the use of solid fibre board cartons to contain not less than fifteen nor more than seventeen rabbits.

CFS 5-6-24A Beef, Bone Out, Packaged and Frozen (for the Royal Navy)

This specification was redrafted to include:—

- (i) Deletion of "of 'chiller' and/or first quality, graded" — and insertion of

"graded as first quality" in clause 4.

(ii) Reference to solid fibreboard containers in clause 5, and in clauses 17, 21 and 22.

(iii) Redrafting of clause 12.

(iv) Details for prepacking in polyethylene bags, clauses 14 and 17.

(v) Temperature specifications for quick freezing at -35°F, clause 15.

(vi) Change of pack from five to six blocks per outer, clause 17.

CFS 7-2-4 Carrot, Dehydrated

This specification was amended to include the words "of Red Core Chantenay or other approved variety" after the word "maturity" in Clause 4 and the deletion of the words "of suitable varieties of carrots (*Daucus carota*)".

CFS 7-2-12 Instant Mashed Potato Flakes

The initial specification for this product was circulated in July, 1964.

CFS 7-2-13 Beans, Green, Dehydrated — Initial

This is a new specification drawn up to cover the produce prepared by blanching, sulphiting, freezing and dehydrating slices of approved varieties of *Phaseolus vulgaris*.

In July, 1964, the following other alterations to specifications were circulated to the holders of 1,186 handbooks.

CFS 1-2-1/1 — Oatmeal Amendment

CFS 1-4-3A — Gluten Revised Specification

CFS 1-4-7/1 — Sausage Meat .. Amendment

CFS 5-9-2A — Meat Paste Revised Specification

Following the retirement of Mr. H. R. Tinney, the new chairman of the Commonwealth Food Specifications Committee is Mr. L. N. Thornton.

(Signed) H. G. JESSEP

APPENDIX H

Report of the F.T.A. of Queensland

FUNCTIONS:

The functions of this Association embraced two Annual Dinners, Two Buffet Functions immediately following the Annual General Meetings and two Golf Days.

ANNUAL DINNERS:

The 1963 Annual Dinner for members and their ladies was held at the National Hotel in November and took the form of a Dinner/Dance which was very well attended. An excellent Floor Show was also provided during the evening. The 1964 Annual Dinner was held at 29 Murray Street in December and once again took the form of a Dinner/Dance and was particularly well attended.

GOLF DAYS:

The first of these was held in October 1963 at the Oxley Golf Club and being the inaugural event, was not as well attended as envisaged but was a most enjoyable fixture. The second Golf Day was held at the Keperra Country Golf Club in September 1964 and was much better attended. We anticipate an even bigger attendance for the 1965 Golf Day.

ANNUAL MEETINGS:

Following the Annual Meetings in July of 1963 and 1964 a *Stag Buffet Party* was held. The food and drink for this affairs which generally has an attendance of about 100 members and their representatives is

provided by the members of the Association and is always highly successful and no doubt will be continued on an Annual basis.

TECHNICAL LUNCHEONS:

Late in 1964 the Association followed the example of at least one F.T.A. in the south and introduced *Technical Luncheons* commencing at 12.45 p.m. and concluding at 2.00 p.m. This allows for a quick drink, luncheon and a guest speaker. The guest speaker follows the luncheon speaking for about 25 minutes duration. Despite the title, these luncheons are not purely Technical, every other one being of a general nature with a talk delivered by a speaker on some subject of topical interest. It is intended to continue these successful luncheons during alternative months of the year.

EDUCATIONAL ACTIVITIES:

A Factory Operatives Course aimed at the level of foremen and similar personnel was staged in May 1964 and was highly successful.

Excellent speakers on a variety of subjects pertaining to the foremen's work were delivered and the Course was well attended and enabled the Association to derive a small income from its efforts. It is anticipated that a further Course of a similar type or amended type will be staged in 1965.

FACTORY VISITS:

Highly successful and informative visits were organized and the premises of Castlemaine Perkins Brewery, Queensland Butter Board and Arnott Morrow Pty. Limited were visited on separate occasions. All of these visits, one of which was a family night, were exceedingly well attended.

The Technical and Social Functions Committee of the Association is at present drawing up a programme of similar functions for future occasions.

(Signed)

A. DOWNING,
Sectional Secretary

Report of the F.T.A. of N.S.W.

FUNCTIONS:

The main functions of this Association are two per year, the Golf and Bowls Day and the Annual Dinner.

The Golf and Bowls Days have been held during the month of May in each of the two years that this report covers. These have proved most successful since the formation of a special Golf and Bowls Day Committee, and have resulted in approximately 150 people being in attendance on each occasion. They have been held at Concord Golf Club, being one of Sydney's "A" Grade Clubs, with excellent catering facilities. The golfers usually number between 80 and 90, whilst the number of bowlers approximates 25, all of whom participate in the buffet dinner which follows,

together with another 60 or so, who attend for the catering side only.

The participants are not limited to members of the Food Technology Association. Members are encouraged to bring guests, particularly from non-member Companies, which it is felt assists in broadening the image of the F.T.A.

The Association's last two Annual Dinners have also been successful, there being in attendance 110 and 135 respectively. This latter number is a record for this function. *Amory* at Ashfield has become the established venue for this function, and a Guest Speaker has also become an established feature. In 1963 Mr. J. A. Milroy spoke to the gathering on the subject of "*Decimal Currency*", which at the time was a topical subject, whilst in 1964 our

ex-President, Mr. F. Maxwell Watts, was the Guest Speaker. His subject was "A Few Comments", at which the opportunity was taken of expressing to members generally the view which he held of the excellent work that was being undertaken by the Association on behalf of the Food Industry generally, and the necessity for it to engage in a greater degree of public relations activities, as a large part of the Industry had little or no knowledge of that which the Association was undertaking on its behalf.

With the return of Mr. J. Kefford from his overseas visit, during which he represented Australia at one of the inaugural meetings of the Codex Alimentarius Commission, it was thought appropriate that the members should be called together to hear first-hand the latest details on this subject, and in consequence the title of his address was "A Move Towards Greater Freedom in International Trade in Foodstuffs — The Codex Alimentarius Commission and Its Effects on Australia".

The function took the form of a jet luncheon. It proved most successful. The luncheon started at 12.45 and finished at 2.00 p.m. sharp. This included Mr. Kefford's talk, which lasted for approximately twenty minutes. This enabled those who attended to be back in their offices shortly after 2.00 o'clock.

EDUCATION:

The main educational activity of the Association is its Winter School. This has now been held for seven consecutive years, and is titled "The Foreman in the Food Plant". It is held at the Hawkesbury Agricultural College during the August vacation period. Lecturers are drawn from the C.S.I.R.O. and Industry, and invitations are sent to members of Food Technology Associations throughout Australia. The attendance fell slightly in 1963, when only 27 students registered. Whilst an upper limit of 40 students has always been established, the 1964

course enrolled 45 students. This has been our most successful course to date, and is possibly due to the fact that the topics were changed slightly. On this occasion they gave an accent on plant sanitation and hygiene. This is a *live in* school of a week's duration, and it is interesting to note that at each school there have been representatives from each State of Australia.

SCHOLARSHIPS:

This Association has been setting aside its surpluses from winter schools in a separate savings bank account, and it is with pleasure that we are now able to advise that commencing with the academic year of 1965 the Association offered scholarships to the value of £100 at both the University of New South Wales and the Hawkesbury Agricultural College, for a selected student in Food Technology. It is hoped that we will be able to continue each year with a similar appropriation, even if it necessitates an increase in the enrolment fee for these courses, which is now standing at the remarkably low figure of £15/15/-.

FOOD TECHNOLOGY AS A CAREER

A matter to which the Association has been giving consideration for some considerable time is that of attracting more students into the educational field of Food Technology. In this regard, the Industry has been lacking in suitable brochures for distribution to Leaving Certificate standard students through the school's Vocational Guidance Offices. Our Chairman, Mr. G. H. Robson, and Dr. J. R. Vickery are currently collating the necessary information, which will be forwarded to the Department of Labour and Industry for this purpose. It is felt that this will achieve the desired result.

MEMBERSHIP:

Realizing that a great number of Companies in the Food and allied

industries were receiving the benefit of the activities of the Association and not financially participating in the cost, per medium of membership subscription, a special sub-committee was appointed during the year to launch a membership drive. It is believed that most States are aware of the manner in which this was affected, as copies of the circular and other material forwarded to potential members by the Association were also sent to the State F.T.A. Secretaries.

Whilst the final result of this drive is not yet known, it is pleasing to report that at the time of preparing this Statement the response has been most encouraging, there being approximately ten new members whose subscriptions each amount to £15/15/-.

(Signed)

S. M. ADAMS,
Secretary
G. H. ROBSON,
President

Report of the F.T.A. of Victoria

FOOD ADDITIVES RESEARCH:

The Association continued the support of this project and during the period forwarded the sum of £230. This covers the Victorian estimated contribution to the project for this period. Our Association feels that the work of Professor Wright merits our continued support.

EDUCATION:

During the period under review, the Victorian Association held two courses for members, the first one in 1963 dealt with "*Factory Measuring and Testing in the Food Industry*." The second course was entitled "*Statistical Aids to Production*" and both courses were successful in respect to members attending and also in the financial result to the Association.

ROYAL MELBOURNE INSTITUTE OF TECHNOLOGY:

The Association has continued to be active in supporting the establishment of the Food Technology Course and also in financial support, having donated in all some £5,000 as well as assisting with equipment and apparatus. The Course will, within the next several months, have complete laboratory facilities available for the students attending.

MEMBERSHIP AND PUBLIC RELATIONS:

Current membership stands at 113 Full Members and 24 Associate Members. Since the last C.A.F.T.A. Conference, we have substantially increased our membership subscription which is based on a sliding scale according to the number of employees. It has a maximum of £31/10/- reducing to £10 and has been accepted by our members. Our Public Relations Officer has been active and we now have available a brochure covering the activities of the Victorian Association which will be used along with the C.A.F.T.A. brochure for membership purposes.

FUNCTIONS:

The past two years has found the Association active in respect to functions organized. Two joint Christmas functions with I.F.T. proved most successful and in addition several extremely successful Cutting Bees have been held at the William Angliss Food Trade School. We are extremely fortunate in having this excellent venue.

In conclusion, I would say that the past two years have been successful ones for the Victorian Association. We feel that members have been made more aware of the work being carried out on their behalf and we have been fortunate, over this period, in having an active

and keen Management Committee, and this applies also to the various Sub-Committees.

(Signed)
J. M. KINSEY,
President

Report of the F.T.A. of W.A.

EDUCATION:

Arrangements for an 18 lecture course entitled "*Fundamentals of Food Processing, 1965*", are nearing completion. The course, which is intended for operatives in the food industry up to foreman level, is being arranged by a sub-committee of this Association in conjunction with the newly established West Australian Institute of Technology.

Commencing on 2nd June, 1965, two (2) lectures will be delivered on successive Wednesday afternoons, between the hours of 3.00 p.m. and 5.00 p.m. It is proposed that each lecture will be of 35 minutes duration, leaving 20 minutes for discussion.

At the time of writing this report, the Prospectus and Registration Form are in the process of being printed. (Copies will be tabled at the forthcoming Conference.)

FUNCTIONS:

The following is a brief summary of general meetings and/or functions held since the 1963 C.A.F.T.A. Conference:—

Lectures. "Cellophane Packaging throughout the World", by Mr. R. Brice of Australian Cellophane Pty. Ltd.

"New Brewing Developments Overseas", by Mr. O. M. Hines, Chief Brewer of the Swan Brewery Co. Ltd.

"Filtration and its application to the Food Industry", by Mr. C. R. Fitch, Chemical Engineer of Mauri Bros. & Thomson (W.A.) Pty. Ltd.

"The Aluminium Industry", by Mr. Edward W. Lussky, Chief Chemical Engineer of Western Aluminium N.L., a subsidiary of Alcoa of Australia Pty. Ltd.

"Health Education", by Mr. J. T. Carr, Executive Officer of the Health

Education Council of W.A.

Symposium: "Exports". Guest Speakers were:—

Mr. W. M. Barry, Assistant Manager and Secretary of Coca-Cola Bottlers (Perth) Pty. Ltd.

Mr. T. Powell, Manager of the Honey Pool of W.A.

Mr. F. J. Malone, Secretary of the Export Division of the West Australian Chamber of Manufactures (Inc.).

Works Inspections: Canning Division of the Swan Brewery Co. Ltd. Canning and Bottling Divisions of Coca-Cola Bottlers (Perth) Pty. Ltd. Bottle Making Division of the Australian Glass Manufacturers Company.

Films: "*The VIIth British Empire and Commonwealth Games*", "*Sugar in Fiji*", "*Australian Rules Football*", "*Best Under the Sun*", "*Food for Thought*", "*Well, I'm Blowed*", "*Ord River Project*".

Social: Christmas Buffet Dinner-Dance.

All meetings were well attended and the success of each meeting has been largely due to the efforts of the Programme Sub-Committee.

MEMBERSHIP AND SUBSCRIPTIONS

Excluding five Honorary Members, the Association's present membership comprises:—

57 Full Members.

3 Associate Members.

The rates of annual subscription are as follows:—

Full Members —

1 to 10 employees . . £9 9 0

11 to 25 employees . . £11 0 0

Over 25 employees . . £12 10 0

Associate Members . . £5 5 0

A. M. VERNON,
President

G. E. ROCK,
Vice-president

Report of the F.T.A. of Tasmania

PRESIDENT'S REPORT 1964/65

In an attempt to make F.T.A. in Tasmania more attractive to present and potential members, the number of Management Committee meetings held in the past year was reduced to 3, and functions of a more general nature re-introduced. Excellent programmes in the field of packaging were provided during visits to the premises of C.S.I.R.O., Australian Glass Manufacturers, and J. Gadsden, and the meetings ended with refreshments and general discussion. The Committee is very grateful for the ready co-operation of the organizations concerned, and the tremendous effort they made to ensure the success of the meetings. In addition a pre-Christmas dinner was held at Highfield Hotel, at which Dr. R. F. Cane was Guest Speaker. The attendance at these functions ranged from 20 to 24, a

very pleasing increase over the average of six at meetings last year.

Regrettably, there has been a further decrease in membership which now stands at:—

21 full members, 2 associate members, 2 honorary members.

As in the past, draft regulations have been circulated and comments forwarded to the Technical Secretary.

The Association is fortunate in having had direct representation in the formation of local policy regarding Food and Drug Regulations by virtue of the fact that two members are members of the Food Standards Committee. All members will be pleased to hear that the local Regulations are to appear in loose leaf form.

(Signed)
G. F. ALLISON,
E. G. BESSEL

Report of the F.T.A. of S.A. Inc.

In covering the period of activities and functioning of the F.T.A. since the 1963 C.A.F.T.A. Conference, it can be stated that progress has been made, perhaps not as far as a membership increase is concerned, but of a greater recognition of our Association by Government Departments, the public and other bodies through our participation in numerous fields.

SUBSCRIPTIONS

The resolutions of the 1963 C.A.F.T.A. Conference made it clear that if C.A.F.T.A. was to continue its effective operation and the States were to continue their numerous roles, additional finance was required, and consequently the Management Committee resolved that Subscriptions in South Australia for F.T.A. members be increased from a standard rate of £9/10/- to a sliding scale in proportion to the num-

ber of employees engaged in the food manufacturing industry in all companies.

This scale was:—

1 to 10 employees . .	£9 10 0
11 to 50 employees . .	£14 10 0
51 employees and over .	£18 10 0

This has now been in operation for nearly two financial years and the budgeted loss in membership from the introduction of this new scale was far less than expected.

Under the new scale of charges, the finances relating to subscriptions has therefore slightly increased.

MEMBERSHIP

The South Australian membership stands at 74 members, one Associate member and two honorary members.

A special Membership Sub-Committee has been functioning for the

past eighteen months and although numerous suggestions and recommendations have been placed before the Management Committee and have been instigated, we cannot report any real success from our membership drives.

It would appear that in future any gains in new members will be the result of a persistent personal contact by members of the Management Committee.

FOOD TRADE SCHOOL

The F.T.A. continues to be the parent body and administrator in negotiations with the South Australian Government Education Department towards the establishment of a recognized Food Trade School in this State. The F.T.A., in leading a joint Industry committee of all interested sections of the Food Industry and allied organizations is recognized by the Government as the prime mover in this objective.

Whilst the establishment of a full time trade school is still three or four years distant, progress has nevertheless been made and it is confidently expected that the allocation of over £200,000 will be made in the forthcoming budget estimates.

To prove the sincerity of the approach, moves have been successful for the establishment of part time class room training with practical demonstration work in the Meat Industry. Over seventy apprentices have been enrolled in this course and classes are held every Tuesday.

Classes were to commence at the beginning of the second term this year for the Cake and Pastrygoods Industry and the Australasian Hotel and Catering Institute which would absorb at least another eighty apprentices but because of the clarification of the proposed venue not being received the commencement date could be deferred.

MEETINGS

The Management Committee continues to be particularly active and

meets monthly on the first Tuesday in each month at 12.00 noon. The meetings are Luncheon meetings.

The Technical Sub-Committee, the most active of the Committees, meets on the third Monday in each month or more often, as in accordance with business. The administration of this Committee has been greatly assisted by the appointment of a Technical Secretary, Mr. J. V. Harvey of the South Australian Brewing Company Limited and this appointment has greatly assisted Committee members, and in turn, the T.S.C. Secretary.

Other Sub-Committees which have been functioning are the Membership Sub-Committee, the Public Relations Sub-Committee, the Programme Sub-Committee and the Constitution Sub-Committee.

WEIGHTS AND MEASURES

South Australia has been particularly concerned in this matter and since the beginning of the Cuthill report, has followed very closely the findings contained in the report and last December, the recommendations arising from the State Ministers' Conference.

All States, through the Associated Chambers of Manufactures were given the opportunity of commenting on these recommendations and the F.T.A. in South Australia took a leading part in obtaining comments on behalf of the South Australian Chamber of Manufactures.

The results that were forthcoming from Industry proved the wisdom of our participation and all manufacturers in South Australia can be well satisfied that constructive comments have been endorsed, not only by the F.T.A. Management Committee, but the South Australian Chamber of Manufactures and the Adelaide Chamber of Commerce.

ACTIVITIES

Amongst the activities of the F.T.A. over the past two years, one of the most successful innovations

has been the introduction of a lunch hour address by a speaker of note which has also been proved successful in other States.

The four speakers we have had to date have been confined to overseas personalities and with the past success, we look forward to many more.

Apart from evening meetings, a successful golf day was held and the Annual Dinners and Christmas Functions have continued to prove very popular.

(Signed)

G. F. GREGORSON,

President

A. F. H. DAWSON

APPENDIX I

Report on the Food Additives Research Project, Pharmacy Department, University of Sydney

AN EXPLANATORY NOTE
BY Dr. S. A. TROUT, BRISBANE

Many countries have introduced legislation permitting the use of certain synthetic dyes in foodstuffs. The list of approved dyes differs quite widely in the various countries, probably because the acceptance of these dyes has been based on certain toxicology experiments conducted with animals. Until research on food additives was started by the Pharmacy Department of the University of Sydney under the direction of Professor Wright, little knowledge was available about the Pharmacological properties of the various dyes or their ultimate fate in the animal.

Some foreign compounds and drugs undergo some chemical change in the body before excretion into the bile or urine, and produce compounds which may cause cancer. Others pass through the body unchanged and are therefore less likely to cause disturbance of the organs and body tissue. By the application of radio-active isotopes the Pharmacy Department of the University of Sydney has been able to determine the ultimate fate of the food additive. By modern chemical methods the molecular structure of the various dyes and the metabolites, *i.e.*, the substance produced by the decomposition of

the dye during its path to excretion, is being determined.

The Pharmacy Department is also studying the breakdown products of certain fat soluble dyes and the rate at which these breakdown products are formed. Differences have been found for carcinogenic and non-carcinogenic dyes. The carcinogenic action has been traced to a particular grouping of the dye molecule. Thus it should be possible by Professor Wright's work to determine from the molecular structure of the food additive whether it is likely to produce harmful effects in the body or not. This is the most logical way of tackling this problem of food additives and should result in uniform legislation in the various food producing countries.

One very surprising result is that some anti-oxidants which are used to prevent discolouration in foodstuffs and generally regarded as harmless can undergo change in the body and may possibly produce harmful breakdown products. The identification of these metabolites or breakdown substances forms part of the work being carried out under the direction of Professor Wright.

REPORT:

The work of the unit continues to increase and this year two students were successful in obtaining their

Ph.D. degree with theses based on the work accomplished in the metabolism of azo dyes. A third student will submit his thesis for examination next month based on work carried out on the metabolism of diphenylamine and other amines. These three students were financed by funds provided by the U.S. National Institutes of Health and auxiliary funds from the Commonwealth National Health and Medical Research Council and C.A.F.T.A.

Of the dyes studied in detail, tartrazine was one of the three food colours approved by a W.H.O./F.A.O. Expert Committee in Geneva last December. Professor S. E. Wright was a member of this committee and as an indication of how incomplete is our knowledge of the toxicity and general properties of food colours, only three colours were given unqualified approval from a total of 170 substances examined. The Sydney work was referred to many times in the report of this committee.

Diphenylamine was approved as an additive for the prevention of superficial scald in apples and pears in Australia and the work on its metabolism carried out in the Pharmacy Department proved to be of help to the Commonwealth Food Additives Committee in assessing its safety.

The work done in the unit on the metabolism of butylated hydroxy toluene and butylated hydroxy anisole was also referred to when the W.H.O./F.A.O. Expert Committee reconsidered the status of these antioxidants at the Geneva Meeting.

CONTINUING INVESTIGATIONS:

1. *The Metabolism of Azo Dyes:*

Work on the metabolism of azo naphthol dyes is continuing and microsomal preparations are being used to study the enzyme azo-reductase. The fission of azo dyes by bacteria present in the alimentary canal is also being studied.

2. *Antioxidants:*

The effect of B.H.T. on liver weight in rats is being studied with

a view to obtaining more information concerning any biochemical changes involved. A closer study of the metabolism of B.H.T. is also being made using radioactive materials. The metabolism of other antioxidants such as butylanilines is also under examination and the mechanisms of hydroxylation of these substances is being investigated.

Metabolic studies on the following substances are being carried out in the department with university or other grants:—

Cardiac glycosides.

Terpenes.

Carbamate insecticides.

FINANCE:

The unit continues to be supported by the N.H. & M.R.C. (a research assistantship and a grant for chemicals and animals). The U.S. Department of Health grant has been renewed for a further three years despite the general drastic reduction in grants given for projects outside the United States. The grant was actually increased to \$55,000 (triennial grant) and this will be spent in providing research studentships, a post doctoral fellowship and to obtain expensive equipment. The obsolete liquid scintillation spectrometer for tritium counting is being replaced by an automatic unit to cost \$16,000. An ultracentrifuge is also required. Whether this grant will be continued for a third triennium is difficult to predict.

The C.A.F.T.A. grant is used to provide funds for services not specifically laid down by other grants and is very valuable.

PUBLICATIONS SINCE LAST REPORT:

"The Metabolism and Excretion of Tartrazine in the Rat, Rabbit and Man", R. Jones, A. J. Ryan and S. E. Wright. *"Food and Cosmetics Toxicology"*, Vol. 2, p. 447-452, 1964.

"The Metabolism of some Dimethylaminoazobenzene Derivatives", P. J. Robinson, A. J. Ryan and

S. E. Wright, "J. Pharm. Pharmacol", 16, 80T, 1964.

"The Metabolism of 2-Phenylazo-1-Naphthol-4- and 5-Sulphonic Acids in the Rat", J. F. Barrett, P. A. Pitt, A. J. Ryan and S. E. Wright, "Biochem. Pharmacol.", (in Press).

(Signed)

S. E. WRIGHT

POLYPHOSPHATES IN MEAT CURING

Polyphosphates used in curing of meat contribute to flavour, water retention, colour, tenderness, and juiciness. They decrease cooking shrinkage, too. They have recently been suggested for application to fresh meats and their effect on the growth of pseudomonad bacteria on chicken flesh was therefore studied.

It is reported in "Applied Microbiology", 12, 517, 1964) that both commercial polyphosphates (estimated to contain 75 per cent $\text{Na}_5\text{P}_3\text{O}_{10}$ and 25 per cent $\text{Na}_4\text{P}_2\text{O}_7$) and equivalent mixtures of pure compounds, inhibited the growth of non-fluorescent pseudomonads in pure culture in a synthetic medium. Fluorescent strains grew after a lag period.

Chicken carcasses chilled overnight in slush ice increased 17 per cent and 25 per cent in shelf life when the ice contained 3 per cent and 8 per cent polyphosphates, respectively. In contact with polyphosphate solutions of the same strength at 36°F, the carcasses kept 17 per cent and 67 per cent longer. In antiseptic ice containing 8 per cent polyphosphates, chickens kept 60 per cent longer than in plain water ice.

The inhibition of bacteria by polyphosphates is due to chelation of metal ions essential to the growth of the non-fluorescent forms. Only fluorescent pseudomonads grew in the presence of 3 per cent and 8 per cent polyphosphates.

POST-HARVEST STERILIZATION OF ORANGES AGAINST QUEENSLAND FRUIT FLY

Tests results are given in "C.S.I.R.O. Food Preservation Quarterly", (24, 1964) for experiments carried out to determine the most effective method of sterilizing oranges against Queensland fruit fly larvae by ethylene dibromide (E.D.B.) fumigation.

Low temperature treatment was also investigated but this was found to be less convenient on account of space and time involved in storing the fruit at low temperatures for the necessary 14 days; there is also a risk of cold damage to the fruit.

Recommended E.D.B. doses for given fruit temperatures are summarized, e.g. a dosage of 24 oz/1000 cu. ft. at $60 \pm 3^\circ\text{F}$. Tests have shown that rind damage is not likely to occur at the recommended doses.

New Zealand has officially recognized the E.D.B. fumigation of unpacked oranges as an acceptable measure against the fruit fly, for quarantine purposes.

AUSTRALIAN PRAWN SURVEY

Expenditures of up to £25,000 from Australia's Fisheries Development Trust Account have been approved for the purpose of a two year survey of the shrimp fishery potential of the Gulf of Carpentaria. The survey is being conducted jointly with the State Government of Queensland.

NEW CARTON

A new, heat-sealable, high-gloss barrier coating for use in producing lower-cost, wrapper-less frozen food cartons, was shown for the first time at the National Frozen Food Packers Exposition in San Francisco in March.



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Sorbitol is super-versatile. It's used widely for its many properties. As a moisture conditioner it also improves fruit cake quality and prevents drying out on standing. The addition of Sorbitol, which occurs naturally in fresh fruit, markedly improves dried and glace fruits, retaining softness, natural colour, appearance and flavour during storage. Included in icings it improves texture, and retards cracking and drying out. It's also used in diabetic foods.

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BOOKS, PAMPHLETS, etc.

✓ *"Report on the Inter-relationships Between Income and Supply Problems in Agriculture"*

Committee for Agriculture, Organization for Economic Co-operation and Development, Paris, June, 1965.

✓ *"FREEZE-DRYING ATTITUDES"*

United States Department of Agriculture, Economic Research Service, Marketing Economics Division, 1964. 20 pages.

General, non-technical discussion of the freeze-drying industry and possible future developments. Includes an 11 page Directory of processors, manufacturers of equipment and consultants.

✓ *"DEHYDRATION OF FRUIT AND VEGETABLES"*

The Fruit and Vegetable Canning and Quick Freezing Research Association has recently produced a Technical Bulletin on fruit and vegetable dehydration. This Bulletin consists of a review of methods applicable, in the main, to particulate fruit and vegetable materials. Subjects covered include preparation of raw materials, equipment and methods of hot air drying, dehydrofreezing and freeze drying. The bacteriological aspects of dehydration methods, and the nutritive values of dried foods are also discussed.

Available on application to the Librarian, Campden Research Station. Price 8/6.

✓ *"SYMPOSIUM ON FLAVOUR POTENTIATION"*

A. D. Little Inc., Cambridge, Mass. 1964. 29 pages.

Seven papers discuss the use of monosodium glutamate, the nucleotides and other enhancers of flavour.

✓ *"SORBITOL IN FOOD PRODUCTS"*

39 pages. Howards of Ilford, Ltd. 1964.

Properties and uses are described.

•
"ABSTRACTS OF U.N. SPECIAL FUND AND E.P.T.A. REPORTS"

Quarterly list. Publication and Main Documents, Supplement No. 2. F.A.O., Rome, April, 1965.

This document is intended to be the first step in implementing the initiative supported by the Conference at its twelfth session of "making technical report literature issued by F.A.O. and by other international organizations more effectively and readily usable". It is a supplement to the "Quarterly List of Publications and Main Documents."

As a start analytical summaries will be issued of all the technical assistance and United Nations Special Fund reports published by F.A.O., beginning with the most recent issues. These summaries are classified by subject matter.

Each summary is in the language of the report and shows: the name of the country where the survey was made, the title of the work, the name of the author, the year, the number of pages (including any maps and charts appended to the text) and the number of the report.

The document contains indexes by subject matter and country.

•
"Examination of Foods for Enteropathogenic and Indicator Bacteria"

123 pages. U.S. Department of Health, Education and Welfare, Public Service Publication No. 1142. 1964.

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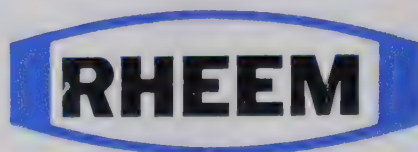
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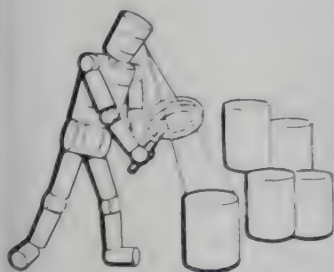
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Vinegar

Meat Canning,
Pudding and Cake

Suitability Test

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Must have uniformity and be tolerant to the negatively charged material in the extract.

Must have high stability and colouring power. Generally electro-positive.

Must have high colouring power, stability to acids, also tannin resistance.

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"INDUSTRIAL FEEDING AND CANTEEN MANAGEMENT IN EUROPE"

Report of the Joint Symposium held in Rome, Italy, 2-7 September, 1963. F.A.O. Nutrition Meetings Report Series No. 36. Published under the auspices of the Food and Agriculture Organization of the United Nations, International Labour Organization and World Health Organization. 44 pages. F.A.O., Rome, 1965.

This Joint F.A.O./I.L.O./W.H.O. Symposium resulted from recognition by these three United Nations Specialized Agencies of the increasing importance of industrial feeding to the health, welfare and productivity of workers.

The report presents a summary of the situation today in selected European countries and suggests some of the steps to be taken if the Specialized Agencies are to assist member countries in the solution of their more urgent problems.

"DAIRY PRODUCE"

A Review of production, trade, consumption and prices relating to butter cheese, condensed milk, milk powder, casein, eggs, egg products and margarine.

Compiled in the Intelligence Branch of the Commonwealth Economic Committee. H.M. Stationery Office, London, 1965. 155 pages.

"Methods of Utilization and Disposal of Cannery Waste Solids with Particular Reference to Applicability in the Alameda-Santa Clara County Area"

By W. A. Mercer. National Canners Association, Western Research Laboratory. Berkeley, California. 1960. 6 pages.

"Code of Principles concerning Milk and Milk Products and Associated Standards"

Drawn up by a Committee of Government Experts under the Joint F.A.O./W.H.O. Programme on

Food Standards. 4th edition. 68 pages. F.A.O./W.H.O. Rome/Geneva. 1963.

"Report of the Seventh Session of the Joint F.A.O./W.H.O. Committee of Government Experts on the Code of Principles concerning Milk and Milk Products"

Held in Rome, Italy 4-8 May, 1964. F.A.O./W.H.O. Rome/Geneva, June, 1964.

"FOOD IRRADIATION"

A quarterly International Newsletter.

This Newsletter forms part of the wider activities of the European Information Centre for Food Irradiation, which was initiated and sponsored by the European Productivity Agency (E.P.A.) of the Organization for European Economic Co-operation (O.E.E.C.) — now the Organization for Economic Co-operation and Development (O.E.C.D.)*. The Centre is now sponsored by the European Nuclear Energy Agency (E.N.E.A.) of O.E.C.D. and by the French Commissariat à l'Énergie Atomique (C.E.A.). The functions of the Centre — which is located at the National Institute of Nuclear Science and Technology, Saclay, France — are to act as a contact point for scientists, food technologists, governmental and industrial circles interested in this field, thus encouraging closer international co-operation in the development and application of knowledge in all matters pertaining to food irradiation. One of the major activities of the Centre is the preparation, publication and distribution of the present Newsletter, which is carried out in co-operation with national and international correspondents.

*The Organization for Economic Co-operation and Development comprises the following member countries: Austria, Canada, Belgium, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. Yugoslavia takes part fully in the work of the Organization in the field of agriculture and food.



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CANNING TECHNOLOGY

New Method of Internally Coating Cans

The Continental Can Co., have developed in their Chicago laboratories a method of transferring coatings to flat tinplate or to the insides of cans using an electrostatic charge. The plastic coating used is first vapourized and reforms as a solid coating on the metal during discharge. Longer discharge times give thicker coats. High chemical inertness and corrosion resistance is claimed for coatings produced by this method, which is called the Glow Film Discharge Process. Savings in coating materials are expected to be as much as 75 per cent compared to conventional methods.



Flavour Effects of Disodium Inosinate

Workers in the Arthur D. Little Co., Cambridge, Massachusetts, have been investigating the effects of using the *flavour enhancer* disodium inosinate on a variety of preserved foods, including some canned vegetables. While enhancing the natural flavour of some products, and producing a sense of increased viscosity, it is claimed to suppress the *canned* or *processed* character of some canned vegetables.



Cannery Cooling Water and Plant Hygiene Surveys, 1964

Throughout the year and particularly during the height of the fresh fruit and vegetable canning season, the Metal Box Company assists U.K. canners in carrying out surveys of their cooling water and plant hygiene. Despite the overall satisfac-

tory standards, unsatisfactory line hygiene and inadequate chlorine dosage of cooling water were still found and served to emphasize the value of these surveys. From this year's survey there is also evidence to suggest that with continuous cooker lines, regular checking and the automatic control of the chlorination of the cooling water, supported by efficient can drying methods, are the only reliable ways of obtaining consistently high standards of hygiene.



Vapour Coating Process for Steel Plate

Aluminium-coated, light-gauge steel plate could compete with conventional tinplate for food packaging, according to its developers, the United States Steel Corporation. In this process, aluminium is heated in a crucible to vapourizing temperature by electronic means, and the vapour is deposited on a moving steel strip. The process is carried out in a vacuum to prevent the vapour from oxidizing. Metals other than aluminium may also be used.

The resulting product is claimed to possess good formability, corrosion resistance and lacquer adhesion.



High Speed Canning in Aluminium

Dulany Foods Inc. are packaging tuna fish in shallow drawn $\frac{1}{2}$ -lb. aluminium cans at 240 per minute. The aluminium can is said to preserve the fresh tuna flavour better than tinplate.

In conjunction with Reynolds Metals Co. (the can suppliers), major modifications have been made in construction of the cans and can handling equipment (de-palletizer, double seamers, case packers, labelers, etc.). These are described and illustrated in "*Modern Packaging*" (Oct., 1964).

Conventional tinplate can seaming rolls are used, with a much

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looser adjustment; the body and end hooks on the cans are increased from an initially shorter length to the 0.076 in. and 0.078 in. measurements common with tinsplate cans — the resulting seam is said to be equal in quality to tinsplate. The cans, which measure 307 x 111½ and have a wall thickness of 0.010 in., have 3 strengthening rings on both top and base. A thermo-formed polystyrene cover cap, which serves to reclose the cans, is supplied with each can.

Disposal of Cannery Wastes

Profitable and unprofitable methods of disposal of fruit cannery wastes are discussed by J. F. Kefford, in "*Aust. Food Manuf.*" (August, 1964) with emphasis on the problems of disposal of pear waste which present difficulties on account of their soft wet consistency. Citrus and pineapple wastes are suitable for profitable disposal as stock feeds after drying and processing; there have also been successful attempts to recover edible sugars and fermentation alcohols (for the vodka industry) from fruit wastes. Methods of disposal include sewage treatment, dumping, burning and composting.

Cemented Seams

A revolutionary new MiraSeam metal container, developed by the Canco Products Group of the American Can Company, embodies an entirely new concept in can manufacturing. With the side seam lapped and held tight by cementing, rather than by the conventional soldering method, the container provides exceptional opportunity for colourful, wraparound lithography on the entire can body. Rather than limiting can-making materials only to those which are capable of being soldered, this new method makes it possible to form cans from materials other than the traditional tin plate. The *MiraSeam* can is avail-

able in either the conventional or the lift-tab top.

Shipping Damage to Canned Food

A series of slides to demonstrate principles of packaging has been prepared by the Association of American Railroads, in an attempt to reduce damage to canned foods during handling and shipping. Laboratory performance tests are illustrated, emphasis being placed on the necessity for correct vertical alignment of shipping cases.

It was found that three cases (filled with No. 2½ cans) in straight and offset alignment, had creasing resistance of 60 per cent and 34 per cent respectively, in comparison to a single filled case. Damage prevention recommendations are summarized.

"Food Technology" (August, 1964).

Discoloration in Processed Cauliflower

Possible causes are discussed of the type of discoloration occurring in processed cauliflowers, which is not caused as a result of excessive heat processing and is distinguished by the considerable colour variations displayed (pink to green/black). Varieties, agricultural treatments, harvesting time and temperature prior to processing have all been shown to affect this type of discoloration.

Work has indicated that ascorbic acid, a recommended additive for canned cauliflower, may, if used in quantities higher than the stipulated levels, be responsible for a pink coloration. The possible role of polyphenols and polyphenol complexes with iron and tin as contributory causes to discoloration are discussed. The use of lacquered cans is recommended.

B. V. Chandler, "Food Preservation Quarterly", 24, 11, 1964.

The Modern Hygienic Method for Handling of Foods!

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SEAMLESS, ONE-PIECE PRESSING
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F.T.A. OF QUEENSLAND

A Technical Luncheon was held on Tuesday, 6th July at Lennons Hotel. The speaker was Professor Gordon Greenwood, Professor of History and Political Science at the University of Queensland. His address was entitled "*Australian Foreign Policy and its Effect on the Community*". Technical luncheons are held once every two months, and on this occasion was attended by 40 members.

The Annual General Meeting was held at the Queensland Chamber of Manufactures on Friday, 30th July. At the meeting, the President (Mr. D. I. Shew) presented his Annual Report.

POINTS FROM THE PRESIDENT'S ANNUAL REPORT, 1964-65

Gentlemen,

I wish to present to you, on behalf of your Committee, the report of activities of the Association for the past year. This account should have been delivered by Roy Casey who began his second year as President last July, but was promoted and transferred to Sydney early this year. We have all missed him greatly and only hope that we have completed the year the way he intended.

One of the problems facing the Committee of any organization is whether it is doing all it can to function in the best interest of members. The food industry is only loosely knit and one of our aims is to create the means by which members may feel they can join together for the good of the industry.

The following is an account of the activities of the past year:—

FOOD AND DRUG REGULATIONS:

As each year passes many drafts reach finality and become incorpor-

ated into the regulations, but it seems that just as many new ones are commenced. Hence this work appears likely to continue for some time. It cannot be too strongly emphasized how important it is for those companies making products covered by the drafts to examine them in detail and to draw attention to any points with which they disagree or on which they wish to comment. I do strongly suggest that this work should be brought to the attention of top management in each company and one member of the company authorised to prepare comments. Here industry has an opportunity not available elsewhere in the world.

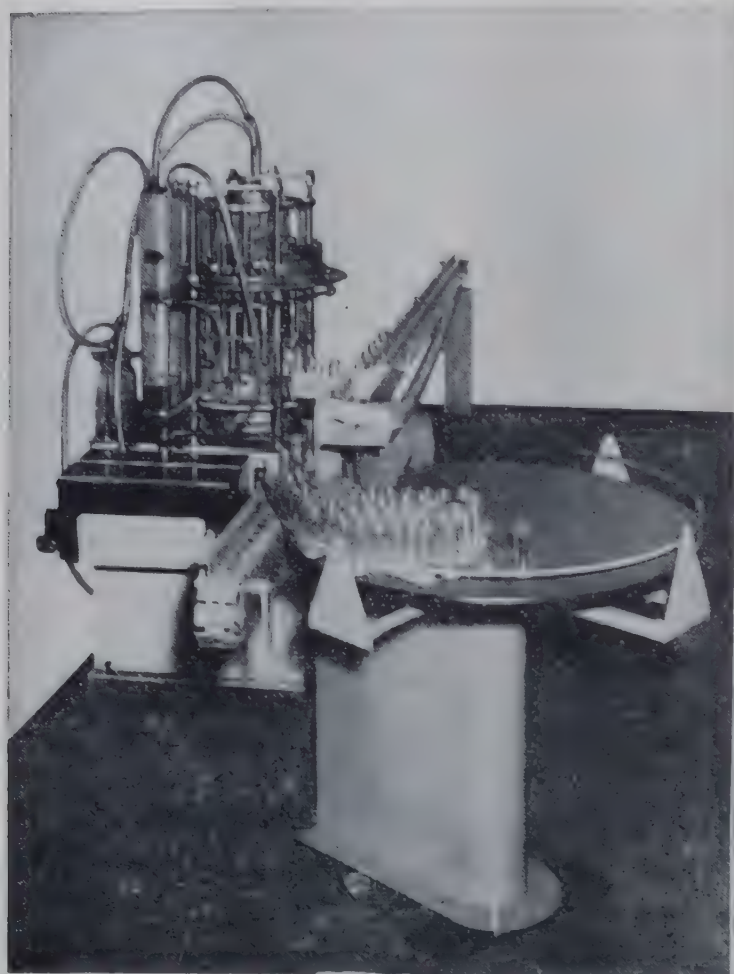
As mentioned last year by Mr. Casey, we have passed a lot of the detailed examination and collation of draft material on to our capable Technical Secretary, Frank Carter. Frank is now enjoying a six months vacation overseas and we are indeed gratified to Rowland Leverington for taking over the duties of Technical Secretary while Frank is away. He has been a great help to the Committee in his zealous approach to this work.

NEW CONSTITUTION:

At the last Annual Meeting the new Constitution was approved and we have been operating under it for the past year. The major changes were creation of the office of Treasurer and election of office-bearers by the Committee. As he was a prime-mover in modifications to the Constitution, Bill Puregger — a past Federal and State President — was quickly appointed to the position of Treasurer. He has worked most assiduously in preparation of the financial records and we are most grateful for the clarity he has

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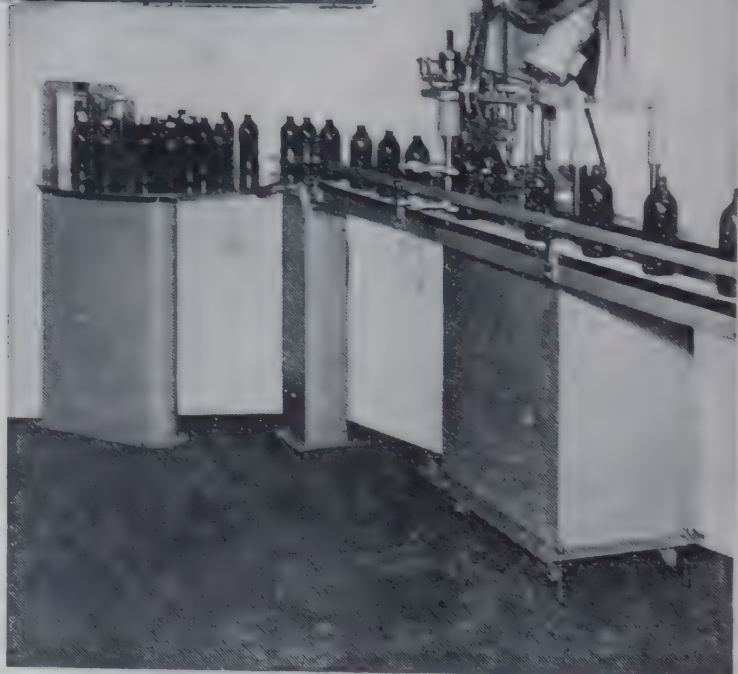
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brought to the presentation of the balance sheet.

FOOD PROCESSING ADVISORY COMMITTEE:

A joint Government-Industry advisory committee to deal with food processing problems has been set up by the Department of Primary Industries. We have been invited to send two representatives to meetings and for the past year we have been represented by Mr. Frank Carter and myself. The Department and Dr. Trout of the Food Preservation Research Laboratory are to be congratulated on this forward move bringing Government and Industry together in order to improve food products.

ACTIVITIES:

On August 25th we were privileged to have an illustrated address by Associate-Professor Reuter of The University of New South Wales on his experiences in Africa with F.A.O. This was quite outstanding in the picture it presented of Africa today.

In October we commenced the new idea of what we termed, for want of a better title, "*Technical Luncheons*". During the year under review we had five of these luncheons with an average attendance of about 30 and the speakers were Mr. Munro (now Sir Alan), Professor V. Skerman, Professor E. Britten, Mr. G. Healy, and Professor G. Greenwood. It is hoped that these functions serve to bring members together in a pleasant and relaxed atmosphere and at the same time hear an address of topical interest.

At the end of October there was an excellent attendance at the Arnott Morrow biscuit factory. This is a most impressive plant and we are grateful to this company for the opportunity of seeing it in operation and for their hospitality at afternoon tea.

At the end of November we staged our Christmas function as a Dinner Dance at 29 Murray Street. The

attendance was 57 and it was a most successful function.

On September 17th the annual Golf Day was held at Keperra Country Club with 20 participants enjoying both the golf and the dinner which followed.

MEMBERSHIP:

The total now stands at 62, the same as at the commencement of the year. In spite of a lot of effort we have not been able to show any real gain. I hope that members will be alert to find new members, either by advising the Secretary or enlisting newcomers themselves.

COMMITTEE:

Ten meetings were held during the year and all were well attended.

I am most grateful to those who gave up so much time and put in so much effort furthering the affairs of the Association. I must also record my appreciation of the work of the appointive members of the Committee — Messrs. F. Carter, A. Howard, R. Leverington, and Dr. Trout. Their knowledge and experience have been of considerable value and we are indeed grateful for their assistance.

Recently, Arthur Downing, who has been Secretary for the past six years has resigned from the Chamber to enter private industry. He has been closely identified with the Food Technology Association and so well versed in its operation both at State and Federal levels that we shall miss him greatly. In his stead we now have Bob Lynde who, I am sure, with experience will be a very efficient Secretary.

I would also like to place on record the valuable work performed by Miss Stanway of the Chamber staff. I am sure that both our former and our present Secretary would agree to this acknowledgment of her sterling work for the Association. Our relations with Officers of the Departments of Health and Weights and Measures have

— Continued on page 714

E.D.T.A. IN FOODS

Ethylenediaminetetraacetic acid (E.D.T.A.) has emerged as a most useful chelating agent with a wide variety of applications in processing foods. Its advantages over other agents with similar functions are demonstrated to an increasing extent as new applications are being established and approved. Chelating agents are required in food products to keep trace metals stable as metal-complexes, thus preventing discoloration and off-flavours due to catalytic oxidation in the presence of free-metal ions.

E.D.T.A. has been used to prevent discoloration of potato products, cooked shellfish, canned fruits and vegetables, to prevent off-flavour in milk, and to control gushing in beer. In carbonated beverages E.D.T.A. promotes flavour retention and reduces discoloration and turbidity on mixing with alcoholic beverages. It is useful as an anti-coagulant in sausage manufacture, and prevents a surface-discoloration in meat spreads and pet foods. These and other uses of E.D.T.A. are discussed in an excellent review by T. E. Furia in the December 1964 issue of *"Food Technology"*.

E.D.T.A. forms more stable metal-complexes with a greater variety of metals than other common chelating agents. However it is influenced by pH; as pH rises, the quantity of metals complexed by E.D.T.A. increases, as pH decreases, greater amounts of E.D.T.A. are needed. E.D.T.A. can reduce free-metal ion concentrates to extremely low levels. Free metal ions in a solution of copper at pH 8, for example, can be reduced to 10^{-16} by the addition of equimolar amounts of E.D.T.A. The Food and Drug Research Laboratories conducted the toxicological studies upon which the U.S. Food and Drug Administration ap-

proval for E.D.T.A. as a food additive was given. Use of E.D.T.A. has been limited by F.D.A. to the disodium salt ($\text{Na}_2\text{E.D.T.A.}$) and the disodium calcium complex ($\text{Na}_2\text{CaE.D.T.A.}$). One or the other of these forms is permitted at specified levels in 21 foods as of November 1964.

From "What's New in Food and Drug Research".

FOOD HANDLING SURVEY

In recent months officers of the S.A. Department of Public Health have collaborated with the staff of the Institute of Medical and Veterinary Science in making a survey of food premises to determine the bacteriological quality of foodstuffs and equipment.

Thirty-two swabs for bacteriological examination were taken from utensils, benches, and in some cases from food handlers themselves. In addition, 262 samples of food were collected.

The results of bacteriological testing of this material, indicated that 22 of the 262 food samples contained food poisoning bacteria — staphylococci in 21 cases, and salmonella in one. Heavily infected foodstuffs included one sample each of roast chicken, roast turkey, pork, and cream cake, and three samples of pressed beef.

Of the 32 swabs taken, one yielded food poisoning organisms. It came from the cut finger of a food handler. In this case the Local Board of Health took immediate action to prevent the spread of these organisms.

Beware of little expenses. A small leak will sink a great ship.

— Benjamin Franklin

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TROPICAL FRUIT RESEARCH STATION IN N.S.W.

The N.S.W. Department of Agriculture Tropical Fruit Research Station at Alstonville was established in 1959 as a centre for banana and pineapple research. It was also planned to give some attention to other tropical fruits to help to diversify the tropical fruit industry. The banana industry through the Banana Growers' Federation has contributed to the purchase of research equipment for the Station. This indicates a continued appreciation by growers of the value of research.

Most attention is being given to bananas — the major tropical fruit in New South Wales. The Department has been active in banana industry research since the 1920's; its work has been partly responsible for the 50 per cent increase in yield per acre in the last ten years. The Alstonville Station has space and facilities for some types of investigations that were not previously possible.

Banana research in progress includes studies of nutrition, plant-soil moisture relationships, weed control and some aspects of pest and disease control. In addition the design of the Station demonstrates, as well as permits investigation of, fertility retaining practices in plantation layout, contouring and drainage.

Pineapple research is mainly concerned with selection of a suitable type of the Smooth-leaf Cayenne variety for north coast conditions, and the production of clones of good agronomic and fruit quality. Studies of planting material, nutrition, nematode control, weed control and control of other pests and diseases are progressing.

Smaller projects with some other crops have also been started. Macadamia production trials have been an early success. In work with papaws, a cross with *Papaya elongata* as a parent is being carried through to the third generation female in a line breeding programme aimed at producing fruit that will carry well.

Avocado, mango and passionfruit are also under observation to assess their potential and management requirements under coast conditions.

Tropical fruits have not been studied as intensively as temperate zone crops have, especially under New South Wales conditions. Research at Alstonville should increase understanding of the physiology of tropical fruit plants as well as leading to improved varieties and better methods of cultivation and management.

SAROMEX SPICES MADE IN AUSTRALIA

Stafford Allen & Sons Ltd., announce that Mr. Trevor Powell, the Saromex Sales Manager, and Mr. Henry Heath, the firm's food technologist, established a Saromex Spices production unit in Melbourne during their recent visit to Australia. The promotion of Saromex in Australia will be handled by the associate company in Australia, W. J. Bush & Co. (Australia) Pty., Ltd.

Since 1950, the average U.S. citizen has increased his eating of beef by 44 per cent, chicken 65 per cent, and frozen fruit and vegetables 150 per cent, but he is eating 18 per cent less eggs and 40 per cent less fruit.



COMMONWEALTH SCIENTIFIC AND INDUSTRIAL
RESEARCH ORGANIZATION
DIVISION OF FOOD PRESERVATION

Annual Report—1962–1964

1. GENERAL

Survey of Activities

During the past two years some expansion of the Division's activities has become possible as a result of additional finance provided through special funds. The most notable development has been the decision to increase research on meats, of which the volume of production and exports have both increased substantially in recent years.

Early in 1963, the Australian Cattle & Beef Research Committee agreed to make available an annual grant of up to £90,000 for increased work on factors affecting beef quality and on changes taking place in beef during cooling, storage, and processing. This grant will enable the number of research officers engaged in meat investigations to be increased from four to twelve, and the total staff to be increased to about 60 people.

In view of the shortage of laboratory accommodation and the difficulty in obtaining research workers experienced in meat investigations, there can be only a slow increase in staff numbers, but it is hoped to complete recruitment by the year 1968. An area of 13 acres of land has been acquired near the Division's Meat Research Laboratory in Brisbane and new buildings will be erected during the period 1964-66 to allow for the expansion in research and staff. Dr. W. J. Scott was appointed in February 1964 to take charge of the expanded meat research programme, and in due course all such work will be centred in the new Brisbane laboratory.

At a conference held in September 1963, attended by delegates

from meatworks throughout the country and by representatives of the beef export industry and various Government bodies, a Meat Industry Research Advisory Committee was proposed, its function being to maintain liaison with C.S.I.R.O. and to assist the Chief of the Division, Dr. J. R. Vickery, in formulating plans for research affecting the meat industry.

The Division's interests in the chemistry and technology of eggs have recently received substantial recognition in the form of monetary grants from the United States Department of Agriculture, from funds available through U.S. Public Law 480. The sum of £46,000 over five years has been awarded for further studies on the chemistry and biological effects of the cyclopropenoid acids. A further grant of £8,300 extending over three years has been given for studies on the mechanism of the change of ovalbumin to stable-ovalbumin in eggs during storage. These grants will enable the work to be greatly accelerated through the provision of additional staff and equipment.

The Charles F. Kettering Foundation, Ohio, U.S.A., has made a grant of £8,200 to Dr. R. M. Smillie, joint leader of the Plant Physiology Unit, for the purchase of equipment for research on photosynthesis.

After a lapse of several years, fish preservation investigations have been resumed; only small resources of staff and equipment are available, however, for this work.

Difficulty in obtaining suitable research workers has delayed the resumption of research studies on the post-harvest physiology of fruits

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Ans. This is a picture of a fly being electrocuted.

Q. What did it?



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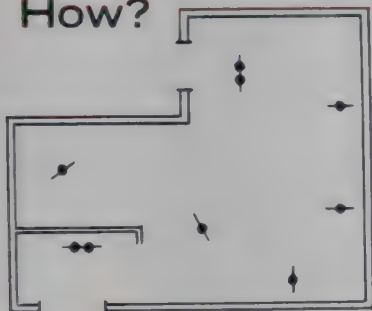
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Ans. SIMON INSECT-O-CUTOR. This is a picture of an Insect-o-Cutor unit which attracts, kills and collects all flying insects.

Q. How?



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FOOD TECHNOLOGY IN AUSTRALIA, November, 1965

705

and vegetables. With the recent appointment of Dr. W. B. McGlasson, it is hoped to make these investigations a more prominent part of the Division's work.

The Division, in co-operation with the New South Wales Department of Agriculture, has been engaged for some years in studies of the post-harvest disinfestation of oranges against Queensland fruit fly. This work has been successfully concluded with the introduction of a commercially feasible method of dis-infestation, and the Technical Committee on Fruit Fly Sterilization Investigation in Citrus (a committee of the Standing Committee on Agriculture) has been disbanded. A newly constituted committee, the Fruit Fly Commodity Treatment Committee, has been set up to deal with the extension of the work to other fruits.

Co-operation with industry has been fully maintained. Frequent talks to industry conferences have been given and a constant stream of technical inquiries have been answered. Our officers are being called upon more and more to give advice and assistance to government departments and agencies concerned with food export, food standards, and public health regulations.

A *technical day* for chemists, engineers, and other technical people in the food industries was held in July 1963. Talks and demonstrations on five new processing techniques were given to 120 visitors.

Two meetings with representatives of management were held in November 1962 and 1963. At these meetings, talks on current research programmes were given, and discussions took place on ways in which the Division could assist the food industry and on how industry could play a wider role in assisting and promoting research.

A close liaison with the food packaging industry has been effected through the formation of a joint technical committee comprising representatives of the Division

and of National Packaging — Australia, an association of industrial groups interested in all aspects of the manufacture of packaging material and the fabrication of packages.

Equipment and Facilities

Additional laboratory space to accommodate the Division's new electron microscope has been provided at Ryde, N.S.W., where the instrument was installed late in 1963. The construction of new laboratories for the group working on the physical chemistry of proteins is now almost complete, and the provision of these laboratories will enable the group to be transferred to Ryde from the University of Sydney, where it has been located since 1948. Some additional facilities have been provided for the Animal Products and Fish Processing sections.

At Gosford, N.S.W., the Citrus Wastage Research Laboratory, operated jointly by the Division and the New South Wales Department of Agriculture, has been rehoused and extensions have been made to accommodate equipment for experimental processing of citrus fruit.

Staff

There have been a number of changes in the senior research staff, arising partly from a transfer of several officers to senior posts in universities. Following the appointment of Dr. W. J. Scott to the charge of meat research, Dr. J. H. B. Christian has become leader of the Microbiology Section. Dr. R. M. Smillie has succeeded Dr. D. D. Davies as joint leader of the Plant Physiology Unit, and Mr. J. Middlehurst has been appointed leader of the Physics Section in place of Dr. H. L. Evans.

Several other appointments have been made in the Senior Research Officer, Research Officer, and Experimental Officer grades. Many of these are normal replacements, but others reflect the expansion that is taking place in certain fields, some

of which have already been mentioned. Dr. W. R. Shorthose, formerly Assistant Lecturer in the Physiology Department, Royal Veterinary College, London, has been engaged to study aspects of meat quality in relation to animal physiology, particularly stress factors. Another new field of investigation for the Division is the rheology of foods, which will be studied by Dr. N. S. Parker, who recently joined the Physics Section.

Mr. D. J. Casimir, a Senior Research Officer of the Canned Foods Section, left in August 1963, to take up a fellowship for one year at Cornell University to study mechanical harvesting methods and the vining of peas. Mr. M. K. Shaw was granted a post-graduate traineeship, financed from the Cattle & Beef Research Committee grant, to spend two years in the Department of Bacteriology at the University of California, Davis.

Scientific Conferences

Officers of the Division have continued to take an active part in conferences convened by scientific societies, both in Australia and overseas. Perhaps the most important conference was the First International Congress of Food Science and Technology held in London in September 1962. This Congress was attended by four officers of the Division, who presented seven papers in technical sessions. The Chief of the Division, Dr. J. R. Vickery, was appointed a member of the International Committee on Food Science & Technology.

Mr. J. F. Kefford, a senior officer of the Canning and Fruit Products Section, attended a meeting of the Codex Alimentarius Commission in Rome towards the end of June 1963, as technical advisor to the Australian delegation. The Commission was set up jointly by the Food and Agricultural Organization and the World Health Organization of the United Nations to lay down an internationally agreed code of food standards.

Dr. F. E. Huelin attended the International Congress of Refrigeration at Munich in 1963 and also the European Meat Research Conference at Budapest; in the course of his journey he visited various food research and other establishments in Europe, North America, and India.

Dr. J. R. Vickery, Chief of the Division, represented C.S.I.R.O. at the centenary commemoration of the birth of Sir William Hardy, the founder of food science, which was held in England in June, 1964. He delivered one of the three commemoration lectures given at Cambridge, his subject being "*Hardy's Contribution to the Application of Science in the Food and Refrigeration Industries*".

2. PHYSICS

Over the period reviewed the work of the Physics Section has been directed mainly into two channels, namely, fundamental and applied research on food dehydration and the solution of problems of food transport. Further computations relevant to the theory of heat and mass transfer (the principles of which were outlined in the 1962 Annual Report) were completed during this period. Bulk storage of specific foods, the cooling of fruit, and certain aspects of instrumentation also received attention.

2.1 Heat and Mass Transfer

Under this item are included those aspects of heating, cooling, and drying of food materials where special attention has been given to the physical principles governing the flow of gases, liquids, or vapours, or the transfer of heat from one point to another.

(i) *Theory.* — Earlier work in this field was concerned with the verification of mathematical equations that could be conveniently solved and that would yet give accurate results for certain parameters over a specified range of variables. Accurate solutions of

the equation relating to the velocity of a fluid near a surface, developed previously, have now been extended and used to compute a large number of Nusselt values. These cover wide ranges of free-stream pressure gradient and rate of mass transfer when the Prandtl-Schmidt number is in the range of 0.5-5.0.

(ii) *Wind tunnel studies.* — Heat transfer in turbulent air has been studied in co-operation with the School of Mechanical Engineering, Sydney University, where a large low-turbulence wind tunnel has been constructed to provide the conditions required for the experimental programme. Methods for recording temperatures and velocities on magnetic tape have been developed and this will enable the results to be analyzed in a high-speed computer.

(iii) *Convection cooling in bulk bins.* — Studies on the storage and transport of fruit being undertaken by the Fruit and Vegetable Storage Section necessitated basic data on natural cooling of fruit stored in bulk. Investigations of rates of cooling of fruit in different types of bin have shown that the rate varies in a predictable way with fruit depth and with the location and extent of vents across the bottom of the bin. From the measured air velocity it proved possible to set up equations describing the heat transfer by natural convection, and these indicated what modifications in venting were required in proprietary hardboard bins. The modifications led to a considerable improvement in cooling rates.

2.2 Food Dehydration

The process of dehydration has been attacked from two related but distinct directions: freeze drying *in vacuo*, and drying with room temperature air having a low dew point. In addition, a special investigation was undertaken for the Peanut Marketing Board on the drying

of peanuts, which led to the design and testing of plant for this specific purpose. (See Section 11.3.)

(i) *Freeze drying.* — The installation of the new pump and vacuum system on the bulk freeze-dryer in 1962 enhanced its performance, and experimental runs have since been made on mushrooms, goat's milk, peas, passionfruit juice, and cooked minced beef.

A laboratory-scale vacuum freeze-drying unit has been constructed to aid in the study of sublimation processes from high-protein foods. The unit is designed to permit continuous recording of the sample weight and also of temperatures at selected points within the sample; it has provision, too, for measuring total and partial water vapour pressure at several locations. From results obtained with this apparatus, a new system of freeze drying has been evolved which gives higher quality products in a shorter time than the usual process requires. One possible mathematical model for the system has been investigated, this involving transient flow under moving boundary conditions in the sample. The predicted rate of mass loss agreed to within 20 per cent with that measured, despite the necessary simplifications in the mathematical model.

(ii) *Dehydrated air.* — The basis of drying with dehydrated air is well known, though the method has been neglected commercially. With the trend towards higher quality products, difficulties are encountered in ordinary air drying, since it can cause a hard, partially cooked skin to form on many products. Drying with dehydrated air at room temperature makes this less likely.

A laboratory dryer utilizing a closed loop system and a spiral heat exchanger for dehydrating the air has been designed and constructed. Results have been encouraging.

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2.3 Instrumentation

The Physics Section is often called upon to assist other Sections of the Division in special investigations involving measurements of temperature, relative humidity, pressure, and other physical variables, but where these factors alone are involved may itself undertake the whole investigation. Interstate rail transport of bananas, and the overseas shipment of fresh fruit in various types of container and of cans of fruit in cartons have been investigated by the Division, and required accurate measurements of the local physical environment at various points. Studies on the storage of peanut kernels required the construction of a special press for determining stress-strain relationships.

(i) *Relative humidity probes.* —

Further work on selenium dioxide probes has thoroughly established their ageing characteristics during a series of life tests of up to 10,000 hours' duration. The main cause of the slow resistance increases was found to be the gradual reduction of the dioxide to red selenium. An attempt to prevent this by applying a mild oxidizing agent was not successful, further life tests on the modified probes establishing that the treatment does not eliminate the drift satisfactorily. As an alternative, a new form of measuring bridge was developed that compensates for the drift electronically.

(ii) *Error E.M.F. in damp thermocouples.* — Errors occur in the measurement of temperature with thermocouples whenever the wires become damp. This effect has been known for some time, but hitherto there has been no known way of estimating its magnitude.

Experiments carried out jointly by the Canning and Physics Sections demonstrated the validity of a theory put forward to predict the magnitude of this type of

error. Predictions were accurate for the combinations copper-constantan, iron-constantan, and chromel-constantan, in contact with distilled water, isotonic sodium chloride solution, or citrate buffer. The experiments confirmed that complete dryness of all parts of the thermocouple circuit is essential for reliable temperature readings.

— To be continued

WATER CONDENSATION ON CANS

The appearance of overseas shipments of canned foods is sometimes affected by water damage. Outer cartons may become wet, can labels wrinkled and discoloured, and cans rusty.

The problem arises from condensation of moisture from the atmosphere on cold can surfaces. This is similar to the condensation that can be seen when a can is taken out of a refrigerator.

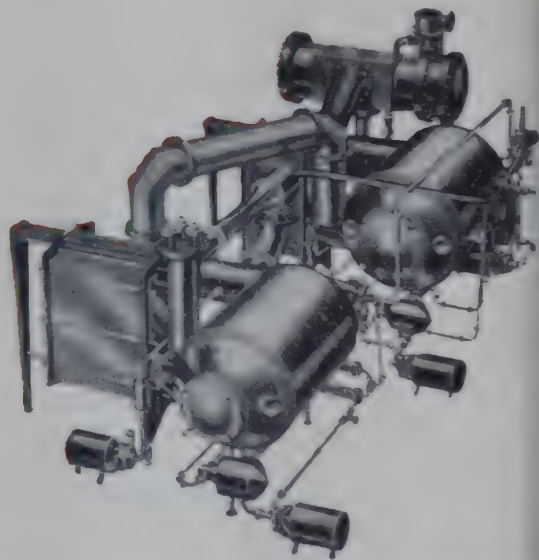
Although water damage concerns all exporting countries, it is of special importance to Australia, since canned goods sent to Britain have been affected seriously. At the request of the Australian Canned Food Preservation, North Ryde, New South Wales, has been investigating this problem and the Board has made a substantial grant to support the work.

Experiments to test methods for reducing or eliminating water damage have been made over the last few months on three shipments of canned fruits from Melbourne. Instruments carried in the cargo spaces recorded air temperatures and humidities and the dampness of cartons and labels throughout the voyage. In addition, ten other ships were inspected at loading and discharge. The results have indicated some possibilities for avoiding water damage, and further test shipments will be made this year.

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MYRISTIC ACID—A KEY TO SERUM CHOLESTEROL?

A paper from the Harvard Department of Nutrition delivered before the Federation of American Societies for Experimental Biology suggests that myristic acid (C-14, saturated) is the most important diet variable governing serum cholesterol levels in humans.

Controlled experiments were described in physically normal subjects with average cholesterol levels for their age. To a low-fat diet of ordinary foods a wide variety of test oils were added in known amounts and serum cholesterol measured periodically and compared with a control group.

Fatty components were classified into 8 categories: five classes of saturated fatty acids, the mono-unsaturated acids, the polyunsaturated acids, and dietary cholesterol. Computer analysis of the data showed that only four of the eight variables influenced the level of serum cholesterol, viz., myristic and palmitic acids, the polyunsaturates, and dietary cholesterol. All forms of the variables accounted collectively for 91 per cent of the effect on the cholesterol levels. However myristic acid alone accounted for 67 per cent of the variation in serum cholesterol observed, and together with palmitic acid, for 80 per cent.

These findings suggest that the fat content of diets for lowering serum cholesterol levels should be low in myristic and palmitic acids and high in polyunsaturated acids. Such diets are most easily achieved when the total fat in the diet is relatively high because the inclusion of the non-effective components may help indirectly to lower the proportions of myristic and palmitic acids.

Analytical data on the content of myristic acid in common dietary fats are limited. Common vegetable

oils, other than coconut oil, contain very little. Myristic acid probably occurs in all animal fats, varying from 1 to 12 per cent. Palmitic acid occurs in all animal and vegetable fats in amounts ranging from 8 to 30 per cent. Polyunsaturated acids vary from 1 to 75 per cent. Myristic acid is about four times as potent as palmitic acid in raising serum cholesterol levels, while the polyunsaturates act in the opposite direction. The effect of any dietary fat on the serum cholesterol level is a result of a complex relationship involving these three components as well as the dietary cholesterol.

From "What's New in Food and Drug Research".

THE PUNCTURE RESISTANCE OF FRUITS AND VEGETABLES

An apparatus is described which measures the force required for a punch to pierce the outer skin of tomatoes, apples and other fruits and vegetables. It is semi-automatic and can process samples rapidly (two people should be able to test 100 items per hour, taking two readings on each item and entering the data in tabular form).

P. W. Voisey and D. C. McDonald. "Proc. Am. Soc. Hort. Sci.", (84, 557, 1964).

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The most recent Census of Manufactures conducted by the U.S. Department of Commerce showed that Cola beverages accounted for 61.1 per cent of total soft drink production. Other Census flavour rankings include: Lemon-lime 11.4, orange 6.2, ginger ale 4.3, root beer 3.9, grape 2.2, carbonated water and club soda 1.9 per cent.

F.T.A. OF QUEENSLAND

(Continued from page 699)

been most cordial and this is in no small measure due to the co-operation of Messrs. W. Kelly and W. Budge of these Departments.

In conclusion, I have to thank the Committee for asking me to succeed Mr. Casey and I hope that the Association will continue to prosper.

*D. I. SHEW,
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Relationship of Peroxide Value and Thiobarbituric Acid Value to Development of Undesirable Flavour Characteristics in Fats

Peroxide and thiobarbituric acid values are often used to follow changes in quality of fats or shortening during storage and to indicate quality after storage under unknown conditions.

The peroxide value and the thiobarbituric value were compared with the flavour score for a series of different types of fats, both with and without added monoglycerides and/or different stabilizers. It was found that neither value yielded a consistently valid flavour score for any given fat. Either value can be used to follow the development of off flavours in any given formulation or product, though relative levels may vary with different products.

Hence, peroxide value and the barbituric value can be used as

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W. D. Pohle, R. L. Gregory, and B. Van Giessen (Research and Development Centre, Swift & Co., Chicago, Ill.). "J. of the American Oil Chemists' Society" (41, 649, 1964).

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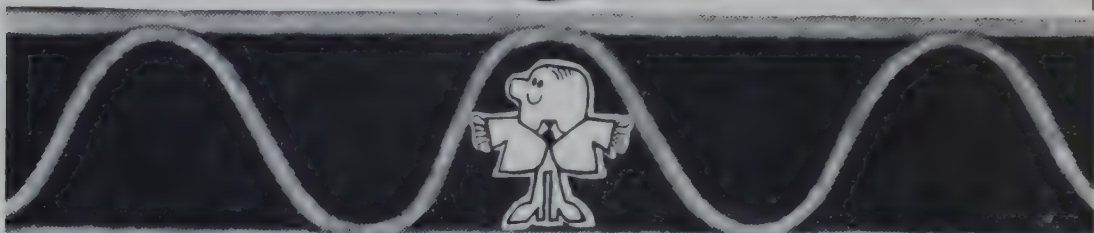
Soviet scientists claim to have produced a synthetic caviar that is indistinguishable from the real thing. According to a Soviet reporter who sampled the caviar, the man-made variety tasted exactly the same as that made by the sturgeon. "Its only shortcoming", he said, "is that you cannot produce fish from it".

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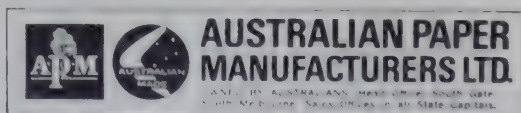
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FOOD TECHNOLOGY



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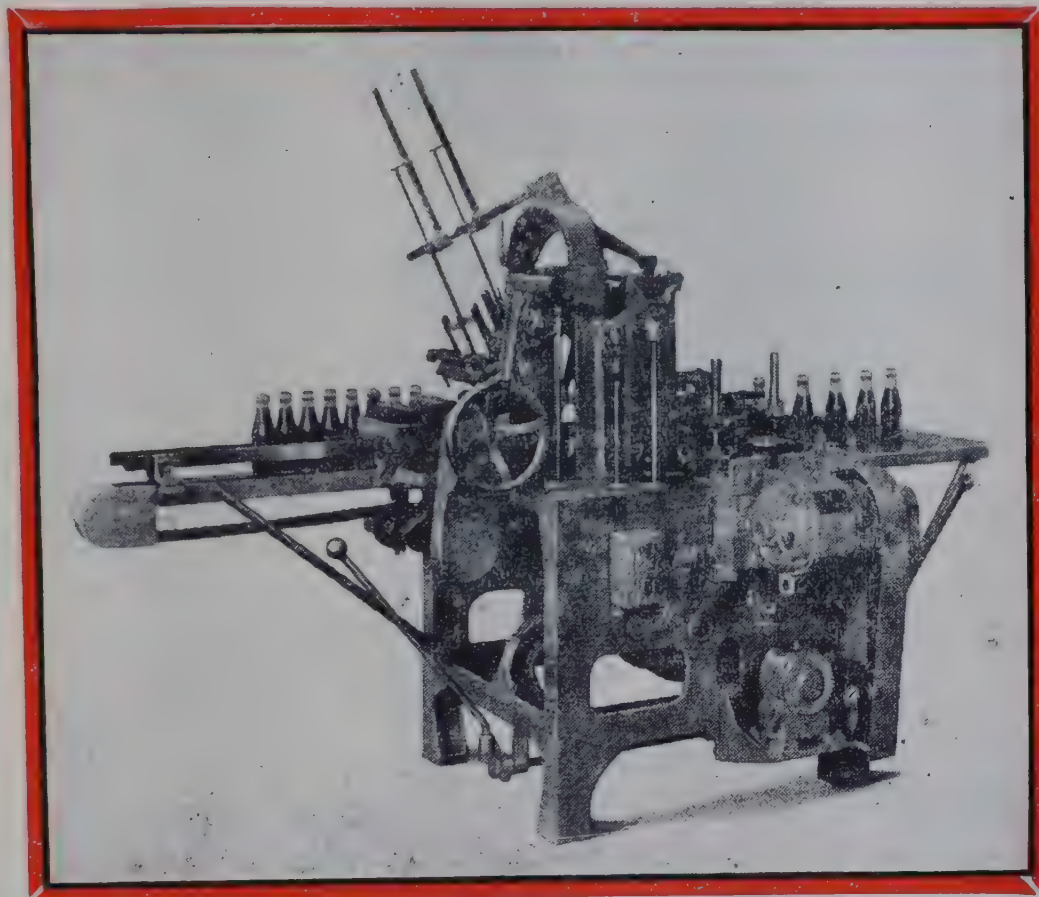
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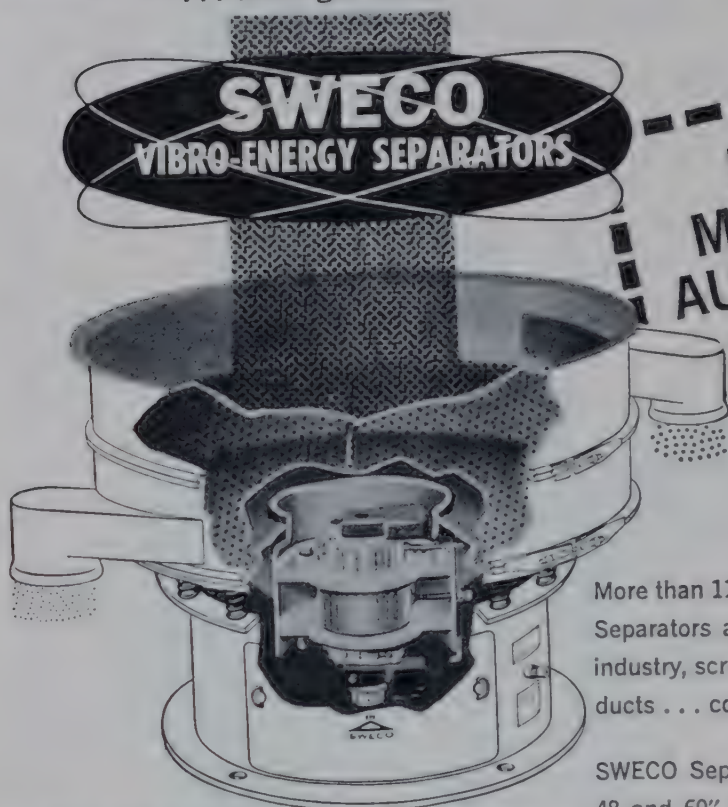
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Editor:

F. H. REUTER, Ph.D., F.R.I.C., F.R.A.C.I.
Associate Professor of Food Technology.
The University of New South Wales.

Business Manager:

S. M. ADAMS.

Office:

12 O'Connell Street, Sydney, N.S.W.
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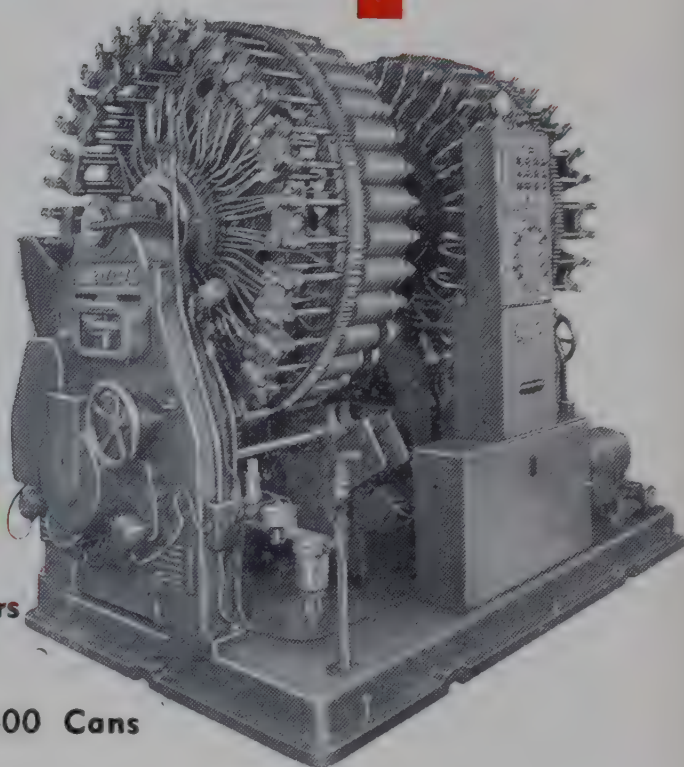
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Message From the President

"A prophet is not without honour save in his own country". St. Matthew xiii, 57. — a much used Biblical phrase that possibly fits the role of the Food Technology Associations in Australia. In no other country of the world is industry permitted to have a voice in the preparation of its own Pure Food Laws. However, much of the food industry already takes this for granted and complacency allows this important work to fall on too few shoulders and to allow the expense to be borne by too few companies.

Visionaries like the late Colonel Adcock, first realized that a complex body like the food industry *can* organize itself to speak with a single — if not unanimous — voice. They realized only too well that the technical section of the food industry, comparatively free from the stresses of commercialism could take up problems where previously other interests gave up under suspicion and distrust.

The Food Technology Associations representing some 600 member companies throughout Australia have patiently and tirelessly worked to bring about a much needed uniformity in the various States food laws.

After much heartbreak, the Council of Australian Food Technology Associations now a national body, convinced the National Health & Medical Research Council that it could undertake a review of the Pure Food Laws throughout the Commonwealth. A C.A.F.T.A. technical secretariat was established in Sydney whose job it is to correlate the technical opinions of all the member companies belonging to each State Association. Over the years, our Association has gradually gained the confidence of the N.H. & M.R.C. We are now accepted as able to give sensible views on Pure Food Law problems and our

two representatives on the Food Standards Committee and Food Additives Committee are held in high regard by their respective colleagues.

While our reputation was still comparatively unknown, much of the food industry, rather apathetically, accepted that we were doing a necessary work but felt that we did not have a great deal of say in shaping the laws. It is one of the axioms of our life that the successful man is always subject to greater criticism as his stature grows. This is now happening to the Council of Australian Food Technology Associations. As our stature grows and as the N.H. & M.R.C. relies on our sincerity and judgment on industrial food health problems, so we are becoming subject to censure from *kindred associations* who feel they are better qualified to speak for their section of industry. It is certainly not the intention to argue against the merits of any individual *kindred association*, but it does seem a little unfair that so many of these people who originally scoffed at our ambitions, are all wanting to jump on the band wagon. C.A.F.T.A. has no intention of denying any interested member of the food industry a voice in their industry formulation of Pure Food Laws. C.A.F.T.A. also made it clear that any *kindred association* may contact directly with a State F.T.A. body even though its member companies may not be financial members of C.A.F.T.A. as we do claim to speak for the majority of the food industry. However, it is obvious that the answer is really to increase our membership to an extent that we speak for the whole of the food industry, for the small man as well as the big, so that all may have equal voice in this important field of Pure Food Laws.

— Continued on page 781

IRRADIATION OF FOODS

Reference was made in the November Editorial to the Report* of the Young Committee on the Irradiation of Foods. Further information has now come to hand in the form of Joint Announcements by the British Ministry of Agriculture, Fisheries and Food, and the Scottish Home and Health Department.

— The Editor

The report of a Working Party which has been studying irradiation as a method of preserving food was published on 20th October, 1964.

The idea of preserving food with ionizing radiation is not new. Research has been going on for a number of years but is now being intensified. Many countries are making individual scientific studies of the irradiation of food (including fresh fruit and vegetables) and are also collectively considering, through such international organizations as the Food and Agriculture Organization and the World Health Organization, problems of legislation and methods of control. The United States Food and Drug Administration has already amended the Federal Register to permit the sale for human consumption of irradiated canned bacon.

The Working Party, under the Chairmanship of Professor F. G. Young, F.R.S., of the University of Cambridge, was appointed by the Chief Medical Officer's Committee on Medical and Nutritional Aspects of Food Policy to review all the medical and scientific information available about the effects of irradiation on food, including its nutritive value, the hazards to human health that could possibly arise and to consider if there was a need to control the use of the process.

The Chief Medical Officer's Committee on Medical and Nutritional

Aspects of Food Policy was constituted to consider and advise on medical and scientific aspects of policy in relation to nutrition and the medical and nutritional aspects of risks to human health associated with the introduction of new substances and practices in the agricultural and food industries. Under their terms of reference they set up the Working Party on Irradiation of Food early in 1962.

The Working Party has considered the wholesomeness (internationally defined as "nutritional adequacy and safety for consumption") of irradiated foods and their review covered, inter alia, the problems of carcinogenicity, toxicity, mutagenesis, nutritional value and microbiology which might arise from the consumption of irradiated foods.

The Working Party concluded that the preservation of food by treatment with ionizing radiation within defined limits of dose and energy would not constitute a hazard to human health and it had the advantage of prolonging the storage life of food without detriment to wholesomeness. It recommended however that the process should be controlled.

The Working Party recommended that:—

- (1) The irradiation of food and food products intended for human consumption be controlled.
- (2) This control be achieved by means of prohibition with exemption to be granted under conditions to be specified.

*Report of the Working Party on Irradiation of Food. 85 pages, H.M. Stationery Office, London, 1964. 5s. 6d.

(3) Initially, exemption be granted after consideration of an application therefor, which is supported by adequate evidence, in respect of an individual food product treated by radiation in a defined manner.

(4) After experience has been gained of such a procedure consideration be given to the granting of exemption, after examination of an application therefor supported by adequate evidence, for groups of similar foods and food products treated in similar ways.

(5) The evidence submitted in support of an application for exemption include that relating to the following matters: (a) the reasons for the proposed irradiation of the food intended for human consumption and the nature of any special group of consumers envisaged; (b) the source, energy and dose of the ionizing radiation to be used for the treatment of the foods; (c) the nature of the containers in which the food is to be irradiated and subsequently stored; (d) the proposed conditions and period of storage of the irradiated food; (e) the nature and results of tests for wholesomeness carried out on food irradiated under specified conditions, stored, and then cooked if cooking be usual before the food is consumed. The tests should include investigation for a possible diminution in nutritional value and for the possible presence of toxic substances in general and of carcinogens and of radioactive substances in particular; (f) the nature and results of microbiological tests on the irradiated food before and after storage under the stated conditions.

(6) The irradiation of food intended for consumption by animals be not *ipso facto* exempted from the provisions of the prohibiting control.

(7) A body be set up charged with scrutiny of applications for exemption from the prohibiting control, and with advice as to the conditions of their acceptance or rejection.

(8) The composition of the scrutinizing body and its terms of reference be a matter for consideration if and when the other recommenda-

tions in the Working Party's Report have been accepted in principle.

Publication of the report does not commit Ministers, and before deciding whether and to what extent the Working Party's recommendations should be implemented they will give full consideration to representations made by interests concerned from any party of the United Kingdom.

PINEAPPLE VINEGAR

To utilize excess pineapple juice from canning operations, the East Africa Industrial Research Organization, Nairobi (Kenya) has carried out experiments on making it into vinegar. It is reported that the product compares well with natural vinegar. The method of production is briefly described in the "New Scientist", 22, 161 (16th April, 1964).

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Methods of Moisture Determination In Dried Grapes

By F. RADLER and M. GRNCAREVIC,
C.S.I.R.O. Horticultural Research Section, Merbein, Vic.

A survey of methods available for moisture determinations in solid materials is presented with an indication of their applicability to dried grapes. Several of the indirect methods that appear to be applicable to dried fruit are checked in their accuracy and compared with the official and standard methods, generally used by the dried fruits industry. The experiments were aimed at estimating instrumental and technique error and to this end sampling variation was reduced to a minimum.

The determination of the moisture content in foods and similar products is important for the control of deterioration and the establishment of commercial standards. Although the determination of water appears to be simple, many different direct and indirect methods have been developed to suit special purposes, see Table 1.

Of the direct methods which are generally time consuming, only the vacuum oven method (No. 1) is generally used for dried fruits; it is regarded as the official method⁽¹⁾. The other direct methods (Nos. 2-7) are not likely to show great advantage over the vacuum oven method.

The indirect methods for moisture determination are quick but use physical properties of the sample that show an empirical relation to its moisture content.

MATERIALS AND METHODS

Dried sultanas (Thompson's seedless) were obtained from the experimental vineyards of the Horticultural Research Section, Merbein, Victoria. The fruit was dried after the usual cold dip. The samples were taken during the drying from

the drying racks so that the moisture content ranged from 10.5-17.0 per cent.

The samples of about 20 lb of sultanas were kept in tightly closed 4 gallon tins and stored before the experiments in a temperature controlled room at 21-22°C, for more than four weeks in order to obtain temperature and moisture equilibration. As an additional precaution the fruit was very well mixed when small samples were used for measurement.

The following instruments were tested:—

A. Resistance meter, "*Dried Fruit Moisture Tester*". (Manufacturer: Dried Fruit Association of California, P.O. Box 618, San José, Calif.).

B. Resistance meter and electrodes, "*Calipco*". (Manufacturer: J. W. Dodds Pty. Ltd., Carlton, Vic.)

A resistance meter similar to A and B has been described recently by Sykes and Coote⁽¹³⁾.

C. Resistance meter and electrodes, "*Stowell moisture meter*". (Manufacturer: Ferris Bros. Pty. Ltd., Brookvale, N.S.W.)

TABLE 1

Methods for the determination of moisture in solid materials.

No.	Methods and Principle	Reference
A. Direct methods		
1.	Removal of water by drying in a vacuum oven at 70°C	1, 5, 6, 7
2.	Removal of water by drying at 105-110°C	5, 6, 7
3.	Removal of water by heating with infra-red light	5, 18
4.	Removal of water by drying at low temperature over desiccants	5, 6
5.	Extraction of water by distillation (with toluol)	5, 6, 7, 12
6.	Chemical determination of water after extraction	5, 6, 7, 15
7.	Determination of water by electrolysis after evaporation	11
B. Indirect methods		
I. Measurement of properties of the sample.		
8.	Resistance or conductivity	5, 6, 7, 11, 13, 17
9.	Capacitance or dielectricity constant	3, 5, 6, 7, 8, 9, 11
10.	Refractive index	6
11.	Specific weight	6
12.	Absorption of sonic and ultrasonic waves	11
13.	Microwave absorption	11
14.	Infra-red spectroscopy	11
15.	Gas-liquid chromatography	4
16.	Nuclear magnetic resonance	5, 10, 11
17.	Neutron scattering	2, 5, 11, 15
18.	Mass spectroscopy	11
II. Measurement of the humidity of the air space.		
19.	Gravimetric determination of the water content of the air space	7
20.	Determination of the relative humidity by aspiration psychrometer	7
21.	Determination of the dew point	5, 7
22.	Determination of the relative humidity by hair type hygrometer	7
23.	Determination of the relative humidity by electrical hygrometers	7

D. Resistance meter Model Philips type GM 4249/01, A.C. 110-245V, 15W 40-100 Hz.

E. Capacitance meter, "Universal Moisture Meter". (Manufacturer: Associated Developments Ltd., Ireland.) This instrument was kindly supplied by Dr. A. B. P. Page, Department of Zoology and Applied Entomology, Imperial College, London.

F. Hygrometer probe, selenium oxide probe. (Experimental probe kindly supplied by C.S.I.R.O. Division of Food Preservation, Ryde, N.S.W.)

G. Hygrometer, Pernix. (Manufacturer: Lambrecht, Göttingen.)

RESULTS AND DISCUSSION

Samples of dried grapes of varying moisture content were analyzed with the conventional methods in order to determine their accuracy and to obtain samples of known moisture content, which could serve as standards for further experiments.

The official method of moisture determination (vacuum oven method 1) in dried fruit does not yield absolute figures. Under ideal condi-

tions (30 small samples of about 5g were taken from a batch of about 200g of fruit that was minced three times) a mean moisture content of 15.29 per cent was found with a standard deviation of ± 0.1 per cent, which has to be regarded as inherent to the method.

The moisture content of different batches of fruit ranging from 10.5-17.0 per cent moisture was determined by the vacuum oven method and two resistance-type moisture meters (A, B), using existing tables for the conversion of resistance to moisture content, see Table 2.

TABLE 2

Variation of moisture determinations in sultanas by vacuum oven and resistance meters.

	Mean moisture content of samples %	Coefficient of variance
(a) Vacuum oven . .	14.09	0.99
(b) Resistance meter A	15.12	0.62
(c) Resistance meter B	14.57	0.93

The resistance meters show a coefficient of variance of a comparable range to that of the vacuum

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method. This is in accordance with observations of Toner *et al* (14) who found similar results with textile materials. The instrument A. gives a higher reading than the vacuum oven method or instrument B. because the instrument A. is calibrated for Californian fruit which is dried in a way different to the Australian practice.

Of the existing indirect methods for moisture determination the methods Nos. 8, 9, 22 and 23 were considered as suitable for dried grapes and were compared in respect to their applicability to dried grapes.

The moisture determination by refractive index (No. 10) is probably too inaccurate as not the water but

air space only those using hygrometer probes (Nos. 21, 22) appeared to be applicable to dried fruit; the other methods need too large volumes of air.

As the indirect methods use characteristics of the sample which are not obviously and directly related to moisture, the main problem in comparing instruments or methods rests in the difficulty of converting the measured character into moisture content. The following method was adopted. One sample of fruit was measured with the available methods repeatedly. The variance of the results was calculated for the reading of the instrument and the filling of the probes separately. The analy-

TABLE 3

The variation of different methods for the determination of the moisture content in the same sample of dried sultanas.

Experiment No.	Method and Instrument	Mean Value and Standard Deviation	Approximate standard deviation as % moisture*	Approximate coefficient of variance*
1	Resistance meter A .	33.55 $\pm$ 1.57 scale units	$\pm$ 0.07	0.46
2	Resistance meter B .	32.40 $\pm$ 1.16 scale units	$\pm$ 0.07	0.46
3	Resistance meter C .	8.19 $\pm$ 0.392 10 ⁴ ohm 6.66 $\pm$ 0.136 10 ⁴ ohm	$\pm$ 0.15 $\pm$ 0.06	0.98 0.40
4	Resistance meter D + Electrode B	6.73 $\pm$ 0.129 10 ⁴ ohm	$\pm$ 0.06	0.40
5	Resistance meter D + Electrode C	1.21 $\pm$ 0.12 10 ⁵ ohm	$\pm$ 0.30	1.96
6	Capacitance meter E	21.72 $\pm$ 0.57 scale units	$\pm$ 0.25	1.63
7	Hygrometer probe F and Resistance meter D	0.98 [†] $\pm$ 0.025 [†] 10 ⁴ ohm	$\pm$ 0.23	1.50
-	Vacuum oven technique (for comparison)	15.29 $\pm$ 0.10% water	$\pm$ 0.10	0.65

*Obtained by calculation from figures derived from graphs.

[†]Calculated from several samples.

the solids are determined, which comprise about 85 per cent of the total sample of dried grapes. The method using the specific weight as a parameter for the determination of moisture (No. 11) in dried fruits and grains, appears to be very accurate but is very sensitive to temperature changes (Davis and Possingham — private communication). Some of the methods listed under Nos. 12-18 may be applicable to dried fruits, but the very high cost of the necessary equipment is likely to limit their use. Of the methods that are based on the determination of the equilibrium humidity of the

sis of the data showed that readings of the instruments contribute only some 2.5 per cent of the total variation, the remainder being due to variation in filling the electrode part of the instrument. The standard deviation as presented in Table 3 contains both these components of variation. The calculated standard deviation was converted into moisture content according to figures obtained graphically in separate experiments where fruits of known but differing moisture content were analyzed.

The standard deviation expressed as *per cent moisture* can be regard-

ed as the best means to compare the accuracy and performance of the different methods or instruments. It appears that the resistance meters A and B show under ideal conditions a similar or even better s. d. than the vacuum oven method. The other methods show a considerably higher variation. The moisture determination by resistance measurement was checked by combining the usual electrode system of instrument A with a very accurate A.C. operated indicator instrument (Experiment No. 4). The obtained variation does not vary significantly from the results with the much simpler D.C. operated instruments A, B. In the experiments 3 and 5 a fork-type electrode was used. During the experiments a significant shift was observed so that the results are presented in two groups. The shift was observed by using two different indicating instruments and is therefore due to changes in the moisture of the electrodes for which no obvious explanation is available. Disregarding the shift, the s. d. for this type of probe is not smaller than for the electrodes of instrument A (Experiment 4).

The capacitance meter used and the humidity probe (Experiments 6 and 7) show a higher s. d. than the vacuum oven method or the resistance meters. No attempts were made to prove if the difference in the observed variance is significant. Disregarding the higher variance in the results of both methods following disadvantages may be noted.

The use of unminced fruit in the capacitance meter necessitates special care to achieve temperature equilibrium. This is time consuming and requires special apparatus. A further disadvantage of the method is that the fruit has to be weighed and compressed into the measuring cell, which becomes stained and requires frequent cleaning.

The use of humidity probes would appear to be the most convenient of all moisture determinations as they can be operated without handling or preparing the fruit. However, this method cannot be applied when the fruit is not in complete equilibrium

with the humidity and temperature of the surrounding air space (after rain or washing). This is difficult to achieve rapidly.

A simple direct reading hygrometer (hair type, G) has been tested in the course of these experiments, but it gives too slow a response and appeared to be not sufficiently accurate.

The recorded standard deviation for the different methods is only under the given experiment conditions independent of the sampling error which is very likely to be considerable under less favourable conditions.

The presented results lead to the conclusion that at the moment the indirect method of moisture determination in dried fruit by the use of resistance meters gives results that are comparable to the official vacuum oven method. For an improvement of the resistance meter method the use of power driven mincing machines and disposable containers for the minced fruit may be considered.

SUMMARY

Methods available for the determination of moisture in solids are briefly discussed in respect of their applicability to dried fruit. The standard deviations and coefficients of variance have been determined for moisture determinations in sultanas for the vacuum oven method, different types of resistant meters, a capacitance meter and hygrometers. Only the resistance meters show a variation similar to the standard vacuum oven method, therefore this method is — in spite of obvious disadvantages — not likely to be replaced by another procedure of moisture determination in the dried fruit industry.

ACKNOWLEDGEMENT

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E.E.C. DIRECTIVE ON PRESERVATIVES

Of importance to food manufacturers interested in sales to the European Common Market are uniform regulations for food preservatives in the six countries of the E.E.C., which have been established by a directive of the E.E.C. Council.

The provisions of this directive, which was officially promulgated on November 6, 1963, must be applied by all E.E.C. countries within a year of that date.

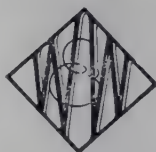
The directive lists the preservatives which may be used in food products and enumerates authorized substances which are principally intended for other uses but which can also have a secondary preservative effect. A subsequent directive, ex-

pected at an early date, will specify the food products in which the authorized preservatives may be employed, as well as the conditions for their use.

Stipulated by the directive are the exact requirements for the labelling of all food products concerning preservatives. According to these rules labelling must employ two of the official languages of the Community — one of these to be either German or Dutch and the other either French or Italian.

The directive applies to all food products and preservatives imported into the Community but does not apply to those intended for export from the Six. The Council is also empowered by the directive to specify standards of purity of food products.

A translation of the Directive with an appendix listing the food preservatives is given in "Food Manufacture", June, 1964.



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CARRAGEENAN

A USEFUL FOOD ADDITIVE

By OTTO CHRISTENSEN,

Chief Chemist, A/S Kobenhavns Pektinfabrik, Lille Skensved, Denmark.

Carrageenan is an extract of certain types of seaweed, and has useful applications as a stabilizer, water binder and thickener. It came into its own during the war as a substitute for agar-agar, and as so often happens, when the product was developed and exploited on a large scale, the substitute was found to be superior in many applications to the material it displaced. This article reviews the latest knowledge about its chemistry and applications.

Carrageenan is the chemical name for an extract of various red algae. The most important of these algae is *Chondrus crispus*, otherwise known as Irish Moss. The name is also applicable to extracts from related species such as *Gigartina stellata*, *Gigartina mamilliosa*, etc. Carrageenan has been known for several hundreds of years; there are records dating back some 200 years which give its various uses. Originally it was used in the preparation of food as a thickener or for setting purposes. It has been used in industry for many years, in brewing for example, where it is used for clarifying beer.

During the last war it was impossible to obtain supplies of Japanese agar-agar, consequently research on the potentialities of Irish Moss were greatly increased and it was found that in certain cases Irish Moss could replace agar. When carrageenan was produced on an industrial scale it was found to be better than previously used products, and for this reason carrageenan is now in demand throughout the world even though agar is again readily obtainable.

RAW MATERIALS

The raw material for carrageenan is first and foremost *Chondrus crispus*. This seaweed is harvested along the shores of the North Atlantic, both on the European and on the American side. Besides *Chondrus crispus*, other related seaweeds including *Gigartina stellata* and *Gigartina mamilliosa* (which grows near *Chondrus crispus*) already mentioned are used.

The seaweed grows on rocky shores in the tidal zone, and in certain areas it can be harvested at low tide, or harvested from boats with a special rake attachment. When it is landed, it is dried either naturally in the sun, or artificially. The greater part of the seaweed is still dried naturally, but artificial methods of drying are increasing. Drying in the open must be carefully watched as the weed is easily spoilt by fresh water, and it has therefore to be protected from the rain.

The dried seaweed is pressed into bales, and then sold to local merchants who in turn sell it to the fac-

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tories. Dried seaweed is sold at a price of approximately 10 U.S. cents per lb.

PRODUCTION

The first stage in the processing is extraction. The seaweed is extracted in water by the addition of certain chemicals. The extract is pressure filtered and decolourized by activated carbon. The purified extract is now concentrated by evaporation, and further purification can be done by either of two methods, namely:—

(1) The older way is simply by drying the concentrated extract on drum dryers. This naturally still contains all the soluble impurities in the extract except those that have been absorbed by the activated carbon.

(2) In modern processing, the concentrated solution is precipitated with alcohol, normally isopropyl alcohol. This process gives a much better purification as the carrageenan will then only contain impurities that are precipitated together with the carrageenan. The precipitated coagulum is dried, ground and standardized by blending with other batches and often with an inert substance such as sugar.

PROPERTIES AND USES

The structure of the carrageenan molecule is not defined with precision, and the term *carrageenan* is used for a series of extracts that could not have the same chemical composition. In literature, the two fractions of carrageenan are distinguished as the *kappa* and the *lambda* fractions. The existence of two such fractions is, according to recent research, rather doubtful, but for suggested structural formulae the reader is referred to the literature^(1,2).

In the proposed structural formula for *kappa* carrageenan, there is a 3-6 anhydrogalactose group. This group seems to be essential in certain reactions in which the carrageenan molecule takes part.

PROTEIN REACTIVITY

The most outstanding property of carrageenan is its ability to react

with certain proteins. This reaction can vary depending on factors like concentration of carrageenan, type of protein, temperature, and pH in relation to the isoelectric pH of the protein, etc. There is certain evidence that the active groups in the carrageenan molecule in this reaction are the 3-6 anhydrogalactose groups. This supposition is strengthened by experiments in which the chocolate milk stabilizing strength of different carrageenans were compared⁽³⁾; when the stabilizing strengths were plotted against the percentage contents of 3-6 anhydrogalactose groups, a clear correlation between the two could be seen.

In writings about carrageenan the term *milk reactivity* is often used. In reality, milk reactivity is only protein reactivity and the reaction is between carrageenan and the casein in milk⁽⁴⁾. This reaction between the casein and the carrageenan changes according to the concentration of the carrageenan used. At low concentrations (about 0.025 per cent) a thixotropic system occurs and a very weak gel is formed. This system is able to keep particles like cocoa in suspension even if the viscosity of the milk is only very slightly higher than normal. If more carrageenan is used the reaction between it and the milk will result in a gel. If about 0.15 per cent carrageenan is used, a gel will be formed which has a consistency of an ordinary flan pudding. One of the main uses of carrageenan is in such puddings.

ICE CREAM

The ice cream industry is another field in which the milk reactivity of carrageenan is a useful property.

Carrageenan is used as an ice cream stabilizer and can be used either alone as a stabilizer or as a component in stabilizing compounds. In recent years carboxymethyl cellulose has been used a great deal as well as natural gums such as locust bean gum and guar gum. These three are all very good stabilizers but there are certain disadvantages by using them alone, one of which is that ice cream mix will separate. This separation can be

avoided if carrageenan is used in addition to the gums.

BEER

As has already been stated, milk reactivity is only one cause of protein reactivity and the protein reactivity of carrageenan is utilized in several other products. In certain cases, the reaction between carrageenan and protein can lead to precipitation. This happens if the protein is in solution at a pH which is lower than the isoelectric pH of the protein. In such cases an insoluble protein/carrageenan complex is formed. This reaction is the explanation for the usage of carrageenan in brewing.

The carrageenan, or moss, is added to the wort and some of the proteins in the wort will be precipitated with the carrageenan. This clarifies the wort and facilitates later filtration of the beer. Another advantage is that the protein thus precipitated could not cause cloudiness in the beer during storage. This reaction also explains why carrageenan cannot be used advantageously with sour milk products and buttermilk products.

GELLING

Carrageenan is used as a gelling agent in water systems. Carrageenan gels can only be formed when certain metal ions are present. This is different from the genuine agars like Japanese agar, but similar to Danish agar (Furcellaran). The highest gel strength is obtained with potassium, ammonium, rubidium or caesium ions. Less strength is obtained with calcium ions.

The gelling mechanism is not known, and there is no full explanation why these ions especially are more active. It is presumed that the reason why some monovalent cations are active while other monovalent ions like sodium and lithium are not, is a difference in ion radius.

The important factors for gel strength are the concentration of carrageenan and the concentration of the active metal ions. About maximum gel strength in relation to the

concentration of potassium chloride is found in a 0.2 per cent potassium chloride solution. This concentration is at the same time the lowest concentration of potassium chloride that could be detected by taste when no strong flavouring agents are present.

Not all types of carrageenan are able to form gels. The types that are able to form gels are the types that contain a high percentage of 3-6 anhydrogalactose units, the same types which have the high protein reactivity. It is possible to produce carrageenans with a very low content of 3-6 anhydrogalactose units and such carrageenans cannot form gels even when potassium ions are present.

Carrageenan gels are thermo-reversible, which means that they melt when heated and gel when cooled again. The melting temperature is only very slightly higher (if at all) than the setting temperature, depending on other components in the system.

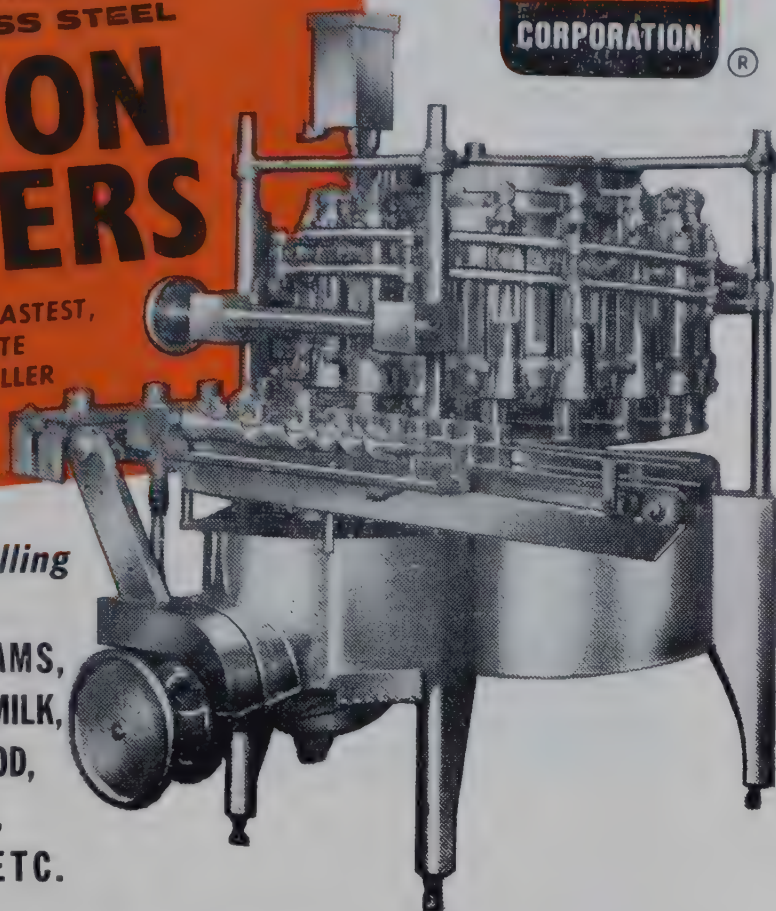
Carrageenan gels often show syneresis. This disadvantage can be avoided by adding water binding products, for instance, another type of carrageenan. An outstanding agent for this purpose is locust bean gum, with which carrageenan shows a sort of interaction; a gel made with a mixture of carrageenan and locust bean gum will not give syneresis and will have other properties. The consistency will be much more gummy than a normal carrageenan gel and the texture will be close to that of a gelatine gel. It is interesting that locust bean gum has an increasing effect on the gel strength of carrageenan. Gelling compounds made with carrageenan and locust bean gum are widely used in the food industry.

VISCOSITY

Carrageenan has strong water-binding properties and is therefore a very good viscosity increasing agent. There is no direct relationship between the content of 3-6 anhydrogalactose units and the viscosity. In practice, carrageenans with low 3-6 anhydrogalactose content are often

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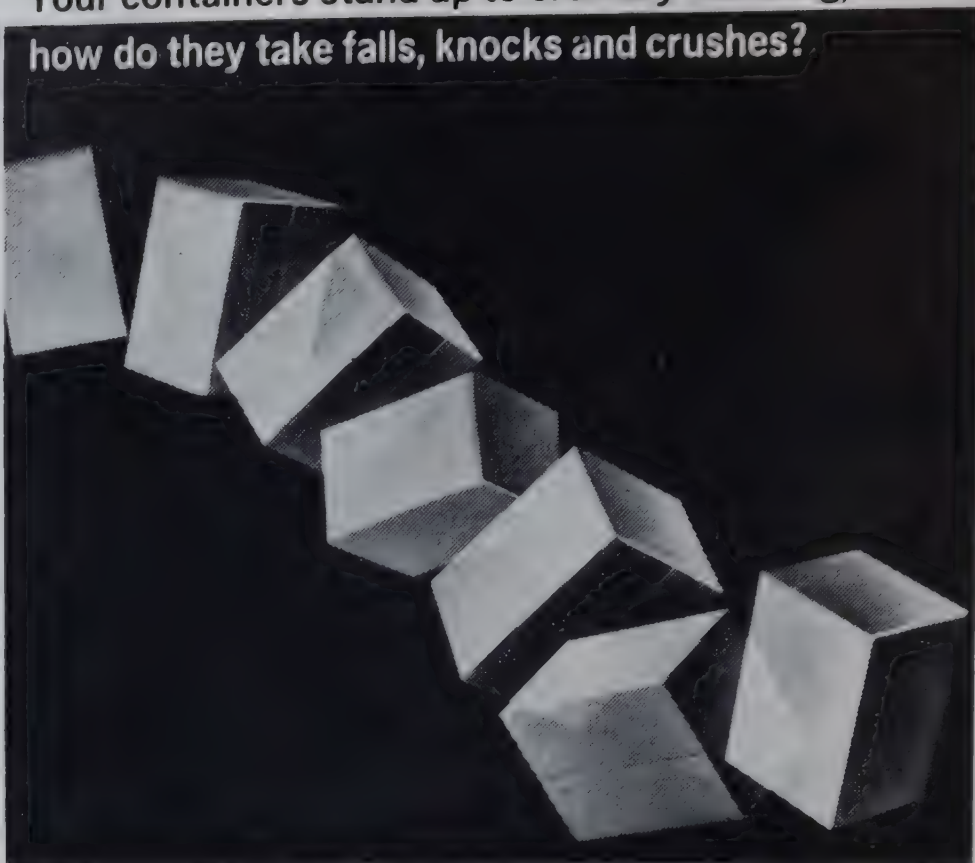
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recommended as viscosity increasing agents because their gel strength is low.

It should also be mentioned that the carrageenan types that are used as viscosity increasing agents will often be the special ones that are produced from red seaweeds, other than from *Chondrus crispus*.

THIXOTROPIC PROPERTIES

A characteristic of viscous carrageenan solution is its very high degree of thixotropy. This makes carrageenan especially suited as a stabilizer for suspensions and emulsions.

Thixotropy means that small particles are kept in suspension as the resistance against movement in the thixotropic system is stronger than the force of gravity. On the other hand, the apparent viscosity is such that the solutions behave like liquids, thus enabling them to be poured without lumps, and they can be pumped like normal liquids.

After standing, a carrageenan solution of this type becomes very thick, but on stirring it will become thin and free flowing, and if allowed to stand again, it will revert to its former thick texture.

The water binding ability of carrageenan is used in water systems either for increasing viscosity or for stabilization of emulsions and suspensions. For purposes of this kind, the main market for carrageenan is for toothpaste but a significant increase in usage of carrageenan for other purposes can be expected over the next few years.

SOLUBILITY

Carrageenan is easily soluble in water. Most types require heating to go into solution. The necessary temperature to dissolve carrageenan will depend on other components in the system. If components like potassium ions that cause gelling of carrageenan solutions are present, it will be necessary to heat to a higher temperature than the melting point of the jelly that would be formed. Normally, heating to 176°F will be sufficient to bring carrageenan into solution, although lower tem-

peratures, for instance 104-122°F, are adequate in most cases.

Some carrageenans are cold soluble. This is especially true of those with a low content of 3-6 anhydrogalactose units. The same is true for some of the types that originate from seaweeds other than *Chondrus crispus*.

Carrageenan goes into solution in milk at a minimum temperature of about 122°F. As with other water binding gums, some care is necessary when carrageenan is dispersed as there is a tendency for lumps to be formed which will only dissolve slowly because the surface of the lumps form a sort of jelly which is impervious to water. In such cases, solution will only take place from the outer surface of the lumps.

SENSITIVITY TO pH

A very important factor in the application of carrageenan is pH. At a pH of 7 and above it is very stable, but below pH 7 its stability decreases, especially with increasing temperature. In practice it is fairly easy to work with carrageenan down to around a pH of 5 as carrageenan solutions with pH between 5 and 7 will stand boiling for a short time. When the pH is below 5, carrageenan solutions will hardly stand boiling and if the pH goes down to about 3, carrageenan will be destroyed within a few minutes of boiling.

By means, however, of special procedures, about which carrageenan manufacturers will give advice, it is possible to use carrageenan at these lower values of pH, and by these means it is largely used as a gelling agent for jams and jellies where the pH must be kept close to that of the natural fruit, i.e. at about 3.5. Another problem which has to be borne in mind at these low pH values is the possibility of protein precipitation.

At lower temperatures, carrageenan is reasonably stable against acids. In practice, no difficulties arise when storing jams with a pH of about 3.5 if they are stored at room temperature.

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PHYSIOLOGICAL REACTIONS

Carrageenan has some physiologically interesting properties. Solutions applied to the skin seem to be absorbed through the skin. This makes it an interesting product for the pharmaceutical and cosmetic industries.

As previously stated, carrageenan has been used in foods for several hundreds of years and based on this fact and several experiments on animals, it may be concluded that the substance is harmless; most countries recognize it as a safe food additive. In countries where lists of permitted additives do not specifically state carrageenan, it is reasonable to expect that permission would be granted on application.

APPLICATIONS

Some examples of the use of carrageenan have already been mentioned. In what follows a summary is given of its principal applications.

1. DAIRY PRODUCTS

In the dairy industry, carrageenan is used as a stabilizer in chocolate milk. Optimum concentration is about 0.025 per cent. In ice cream stabilizers, carrageenan is often used in combination with other gums, and in these cases concentrations varying from 0.01 to 0.05 per cent of the mix are used. Stabilizers of a similar composition to ice cream stabilizers are used in certain types of cheese, *e.g.* cottage cheese.

In Europe, carrageenan is widely used as a component in flan pudding powders. It can also be used in the manufacture of powders for *instant puddings* which are stirred into cold milk.

Recently carrageenan has been found useful in other products and an important use will be in condensed milk. By using recent procedures, it is possible to make condensed milk which is much less viscous than the conventional kind. This new type of condensed milk tends to separate on standing, with the cream rising to the top. This can be avoided by adding a small amount of carrageenan.

2. JELLIES AND MARMALADE

The traditional gelling agent for jams and jellies is pectin. Pectin however requires a very high percentage of sugar content in the product to make it gel. The sugar content should be over 55 per cent. This high percentage of sugar is often found to be disadvantageous as it represents *empty* calories and somewhat masks the fresh fruit flavour. Therefore there is an interest for jams and jellies with a lower sugar content, or without sugar at all, and another gelling agent is necessary. It is possible to stay within the pectin group by using a low-methoxyl pectin, *i.e.* a partly de-esterified pectin. Experience with low-methoxyl pectins which are on the market is not too good as jams and jellies that are made with such pectin have a very short texture and unusual jelly consistency. These jams and jellies also have a good deal of syneresis.

Special types of carrageenan are being used in this field and it has been possible to make modified carrageenans that produce jams and jellies with a texture nearer the normal jams and jellies with no syneresis at all.

A special type of jelly that needs consideration is the table jelly. This can be made with a compound of carrageenan and modified locust bean gum, and a product made in this way has a texture very close to that obtained with a previously used gelling agent, but there are some distinct advantages over these gelling agents. One of these is that the setting time is much shorter so that the dessert can be made only a very short time before it is required. Another important advantage is that the gel strength is independent of temperature.

Normally table jellies with a previously used gelling agent must be made with a concentration of a gelling agent which gives it the right texture for eating either at refrigerator or at room temperature, and a jelly which has a desirable texture at refrigerator temperature will be fluid at room temperature, and a

— Continued on page 761

Food Technology Association of N.S.W.

POINTS FROM THE ANNUAL REPORT FOR YEAR 1963/64

Presented at the Nineteenth Annual General Meeting,
August 6, 1964, Chamber of Manufactures
of N.S.W., Sydney.

MANAGEMENT COMMITTEE

After the election at the 1963 Annual General Meeting, the Management Committee was as follows:—

W. S. Beale (Gordon Edgell Pty. Ltd.), W. B. S. Bishop (Wm. Arnott Pty. Ltd.), Dr. R. A. Bottomley (M.B.T. Research Laboratory Pty. Ltd.), D. Boyce (H. Jones & Co. (Sydney) Pty. Ltd.), P. M. Crocker (Albright & Wilson (Aust.) Pty. Ltd.), J. H. Goldfinch (C.S.R. Co. Ltd.), K. Gilbert (P. Methven & Sons Pty. Ltd.), H. C. Gluskie (Weston Research Laboratories), D. Jarman (Jas. Stedman Henderson's Sweets Ltd.), M. E. Jones (Peek Frean (Aust.) Pty. Ltd.), Dr. V. M. Lewis (Henry Lewis & Sons Ltd.), W. M. McGilvray (Kellogg (Aust.) Pty. Ltd.), T. Purcell (Wheat Industries (Aust.) Pty. Ltd.), G. H. Robson (Australian Consolidated Industries Ltd.), F. M. Watts (Watts Winter Pty. Limited), together with Messrs. N. W. Rodd and P. J. Gibson, the two immediate Past-Presidents.

OFFICE-BEARERS

President: F. M. Watts.

Vice-Presidents: G. H. Robson, Dr. V. M. Lewis.

Treasurer: J. H. Goldfinch.

Trustees: F. M. Watts, J. H. Goldfinch, S. M. Adams.

Appointive Committeemen: R. Fisher (R. K. Newman & Co.), D. W. Grover (M.B.T. Research Pty. Ltd.), W. W. Hopkins (H. Jones & Co. (Sydney) Pty. Ltd.), Professor F. H. Reuter (The Uni-

versity of N.S.W.), Dr. J. R. Vickery (C.S.I.R.O.).

Honorary Associate Members: A. Dowey (Hawkesbury Agricultural College), Dr. R. A. Edwards (The University of N.S.W.), D. W. Grover (M.B.T. Research Laboratory Pty. Ltd.), J. F. Kefford (C.S.I.R.O.), L. J. Lynch (C.S.I.R.O.), Professor S. E. Wright (University of Sydney).

During the year, several changes were effected to the Management Committee. Mr. J. H. Goldfinch resigned in November 1963 both from the Treasurership and the Management Committee and Mr. Crocker elected Treasurer for the remainder of the year. Dr. B. I. Aldrich of the same company was appointed to fill the casual vacancy. Following the resignation of Mr. W. S. Beale the Committee appointed Mr. R. Pryse-Jones to fill the vacancy.

Our Technical Secretary, Dr. R. A. Edwards, left Australia in December to spend at least twelve months overseas on a Research Assistantship in the Department of Food Science and Technology at the University of Massachusetts.

The Committee appointed Dr. P. M. Linklater, Lecturer in Food Technology at the University of N.S.W., as Acting Technical Secretary in the absence of Dr. Edwards.

It is with deep regret that we record the death during the year of Mr. P. Scandrett who will be well remembered as a Committeeman of this Association and as its Treasurer for a number of years.

MEMBERSHIP

The membership of the Association now stands as follows:—

Corporate	107
Associate	14
Honorary Members	4
Honorary Associate Members	6
Past Service Members	6
	—
	137
	—

The view has been expressed that the membership figure should be a lot higher. The blame for this cannot be laid at anybody's door other than that of the Association itself, in that we are selling ourselves insufficiently to the food industry generally. The work which the Association is doing, particularly in relation to Pure Food Regulations is of the utmost importance to industry and the fact that it is not sufficiently widely known or publicized is perhaps one reason why our membership is not greater than it is.

EDUCATION

The Education Sub-Committee of the Association consists of Messrs. G. H. Robson (Chairman), P. A. Baumgartner, W. Beale, P. Crocker, A. Dowey, R. A. Edwards, P. J. Gibson, Professor F. H. Reuter and Dr. J. R. Vickery.

This Committee has been responsible for the formulation of the Winter Schools which have become part and parcel of this Association's annual Education programme. They are held in conjunction with the Hawkesbury Agricultural College and to date have been styled "*The Foreman in the Food Plant*", being designed for personnel in the food processing industries at the supervisory level. It is a live-in course of a week's duration. The enrolment for 1963 fell slightly below the upper limit of forty, this being the first occasion on which this has occurred. A book of proceedings which covers all papers delivered at the School is prepared annually, the circulation of which is strictly limited to lecturers and students.

Whilst there were slightly less than the capacity of forty students at the 1963 course, indications for

the 1964 school are that the registrations will exceed the upper limit. It is interesting to note that there has been a slight change in the programme for this year, in that emphasis is being given to plant sanitation and hygiene.

The Association has always been most fortunate in its relationship with the Food Technology Department of the University of N.S.W. and in this regard has held in the past a number of schools and courses in conjunction with that Department. Whilst none was held during the year under review, arrangements have been made for one to be held during 1964.

Other matters under consideration by the Education Sub-Committee include the participation by the Association in scholarships and the promotion of food technology, particularly by the preparation of career brochures which can be made available to the Careers Officers of Secondary Schools in New South Wales. Both of these matters are of the utmost importance to the future of the industry and it is hoped that further information will be available with respect to them by this time next year.

The opportunity is taken of expressing the Association's appreciation of the efforts of the Education Committee during the year.

TECHNICAL COMMITTEE

One of the most active Committees of the Association is its Technical Committee under the Chairmanship of Mr. W. W. Hopkins (H. Jones & Co. (Sydney) Pty. Ltd.). The Committee is comprised of Messrs. A. L. Bannister, P. A. Baumgartner, W. B. S. Bishop, W. H. Black, S. Chambers, B. de Jongh, G. Ellingworth, R. Fisher, H. C. Gluskie, E. A. Goldrick, D. W. Grover, J. Harris, D. Jarman, M. E. Jones, P. Lever-Naylor, Dr. V. M. Lewis, Dr. C. M. Martin, Messrs. T. Purcell, K. C. Paul, G. H. Robson, W. R. Rogers, P. Thompson.

Our Acting Technical Secretary, Dr. P. M. Linklater, acts as Secretary to this Committee.



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An invitation to join the Committee has been extended to Mr. J. Kelly of Davis Gelatine Ltd.

This year has seen a continuation of the work of obtaining standard food regulations throughout Australia. There has been a further improvement in the efficiency with which views of members are collated and submissions made to the Technical Standing Committee of C.A.F.T.A. In some cases, views of non-members have also been collated and considered by the Committee.

The important matters considered by the Committee are listed below:—

- Tomato products.
- Fruit Juices and Concentrated Fruit Juices.
- Smoke Essence.
- Cobalt in Beer.
- Preserved Whipped Cream.
- Soy Protein in Bread.
- Jams and Conserves.
- Toys in Packages.
- Ascorbic Acid on cheese wrappers.
- Saccharin in Pickled Onions.
- Milk Chocolate Easter Eggs.
- Frozen Food Regulations.
- Frozen Food Code.
- Uniform Labelling provisions.
- Dessert pudding, custard mix and powders.
- Butter and butter products.
- Dried Milk.
- Mayonnaise and related products.
- Cream and cream products.
- Flour and bread.
- Pasteurization of egg pulp.

In addition the Committee considered the report of the Expert Committee on Sugars of the Codex Alimentarius Commission submitted to the Committee by the Commonwealth Department of Primary Industry. This procedure of direct submission by the Department of Primary Industry was necessitated by the very short time allowed for collection of Australian comments. In future it is anticipated that the normal procedures will be followed.

It is noted that C.A.F.T.A. is currently conferring with the appropriate Government Departments on this matter, for it appears that C.A.F.T.A. is to be one of the organizations to which the proposals will be forwarded for comment, for it is realized that it is ideally equipped to obtain throughout Australia the views of industry on any proposals that pertain to processed foods.

PURE FOOD ADVISORY COMMITTEE

As members are aware, Mr. D. Boyce represents the Chamber of Manufactures of N.S.W. on the Pure Food Advisory Committee, and it is through his diligence in this capacity that the Association is able to provide its members with a report covering each meeting of this Committee. This enables industry to be kept posted on proposed legislation. Industry is also fortunate to have Dr. V. M. Lewis and Mr. P. Jones as members of the Pure Food Advisory Committee.

It has already been reported to members that it is understood that the N.S.W. Department of Health has considered a revision of the N.S.W. Pure Foods Act. A Sub-Committee has been appointed within the Association under the Chairmanship of Mr. Robson to study the present Act and the new proposals when they become available and make recommendations to the Management Committee.

The Association has conferred with the Hon. W. F. Sheahan, Minister for Health, and has made certain recommendations. It has also requested the opportunity to comment on the proposed alterations to the Act, and the Association looks forward to hearing from the Department in this regard in the near future.

FOOD ADDITIVES RESEARCH PROJECT

The Association through its Federal body, C.A.F.T.A., has continued to participate financially in the Food Additives Research project under the guidance of Professor S. E. Wright, Head of the Department of

Pharmacy, University of Sydney. As members are aware, contributions to this fund are allowable deductions for taxation purposes. The Association is grateful to its members for their assistance in this matter.

The value of this project is currently under consideration by several of the other State Associations. Your Management Committee appreciates the difficulty of assessing the value of basic research to industry and that Professor Wright's work is initially purely basic. This was fully understood at the time of agreeing to support the project, and the view is held that our support should continue for the period of at least five years as originally considered.

FUNCTIONS

The first function of the year was the 1963 Annual Dinner which was held at *Amory* on September 27, and at which there were 110 members present. The Guest Speaker was Mr. J. D. Milgrove, who spoke on the subject of "*Decimal Currency*".

The Committee recently resolved that as a matter of precedent the outgoing President be nominated to speak at the Annual Dinner on matters which he considers appropriate. As each Presidency is normally for a period of two years, this will mean that this procedure will be adopted every second year.

The 1964 Golf and Bowls Day proved to be an outstanding success. It took place at the Concord Golf Club on April 30 and there were 140 in attendance. This function has now become established as an industry day and should grow in both strength and popularity.

A *Jet Luncheon* was held at the Hotel Australia on August 29, at which Mr. J. F. Kefford of C.S.I.R.O. was the Guest Speaker. He had at that time recently returned from Rome where he represented Australia on the Codex Alimentarius Commission. It is most interesting to note that the procedures adopted by the Commission are not unlike those formulated by the Food Technology Associations throughout Australia to

achieve uniformity of State Pure Food regulations.

GENERAL

CONSTITUTION

During the year it was brought to the attention of the Committee that for taxation reasons it was desirable to amend the Constitution in relation to the clause which provided that surplus funds, at the time of winding up the affairs of the Association, be returned to members. In consequence, your Committee agreed that an Extraordinary General Meeting be held to obtain members' approval to amending the Constitution to provide for surplus funds on winding up being used for educational purposes in the field of food technology.

MEMORIAL GATES

Some members will recall that the inaugural President of this Association was Colonel Adcock, to whom the credit for placing this Association on a sound foundation has been justly attributed. It is recorded here for the information of members that Mr. Roger Dean, M.P., opened the Garnet Adcock Memorial Gates at the entrance to the West Gosford Park on July 17, 1963, in his memory. This is the town in which he established his business, and from where he would travel many times per month to attend to matters pertaining to food technology.

S. M. ADAMS,
Secretary.

F. M. WATTS,
President.

17/7/64.

1965 I.F.T. ANNUAL CONVENTION

The Australia Southern Section, organizing Section of the 1965 Annual Convention have advised that the Convention will be held at the Hotel Australia, Adelaide, from 10th to 14th May, 1965.

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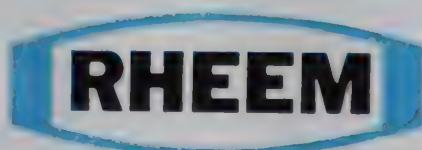
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Applications and information available from: The Registrar, The University of New South Wales, Box 1, P.O., Kensington, N.S.W., Australia.

The Department of Primary Industry and its Relationship to the Australian Food Industry



Continued from Vol. 16, No. 11, page 704

These important functions are the business of the Department's Inspection Branch. The Branch administers laws, separate and distinct from the marketing legislation, dealing with standards of quality, composition and grades for practically all of the foodstuffs of any importance in the Australian export trade.

Most of the regulations concerned have been operating for very many years. In general they are designed to ensure:—

- that processing is carried out under proper conditions of hygiene;
- that the goods reach a minimum standard of composition and quality;
- that the goods undergo a system of inspection and supervision sufficiently precise to allow the issue of acceptable health quality and quarantine certificates;
- that the goods are marked and described in accordance with well recognized principles; and
- that the goods are packed in a way that will ensure their proper protection until they reach the market.

In sum they are designed to create a favourable climate in which trade in goods of dependable quality can flourish without hindrance from technical requirements of the countries in which they are sold. The Department would like to think that

they have served this purpose. We would like to think too, that they also assist Australia's part in contributing to world food supplies by reducing spoilage, maintaining nutritional values and the like.

The inspection of food on the scale undertaken by the Department is a very expensive matter. The Consolidated Revenue Fund is called upon to meet an annual expenditure of the order of over £1½ million for the Department's inspection services. The staff employed is almost wholly technical, comprising both lay and professional personnel. These officers are by far, the largest part of the Department's staff; in fact the Inspection Branch contains more officers than the total of all other Divisions.

How does the Department go about fixing export standards for foodstuffs? We do not have the elaborate system of public hearings and consultations in operation in some countries. Nevertheless, the Department endeavours to consult all interested parties on the form and content of individual standards. As far as scientific advice is concerned, the Department looks to the C.S.I.R.O. Divisions of Food Preservation and Dairy Research. These Divisions have served us very ably, but this does not mean that we are not also receptive to advice from scientists in industry.

In addition to canvassing industry opinion, the Department endeavours to assess the quality requirements of overseas markets, the standards of competing goods, and any statutory

Opening Address by A. C. B. Maiden, Secretary, Department of Primary Industry, at the 14th Annual Convention of the Institute of Food Technologists, Australian Regional Sections, Canberra, May, 1964.



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requirements that may exist in overseas countries. In some instances, overseas requirements largely dictate the form of Commonwealth controls. Regulations on meat hygiene are a case in point. The use of additives may also be confined to those accepted overseas for obvious reasons. The standards which have been adopted represent a combination of all of these factors.

In the course of its administration of these Regulations, the Department encounters many difficult problems of a technical and commercial nature. There have been tremendous changes in overseas food and quarantine legislation in the past decade and many of the problems are attributable to this. In particular, overseas regulatory authorities are becoming increasingly concerned with the public health aspects of food hygiene, additives and contaminants. The studies of the F.A.O./W.H.O. Expert Committees which I mentioned earlier, have doubtless stimulated attention to these matters. Some studies, however, such as those on pesticide residues are still in a very early stage and the development of attitudes to them could have important implications for Australia. We expect too, that the Codex Alimentarius Commission's work will also have some impact on export inspection.

The Department endeavours to keep pace with these problems and if possible to anticipate any developments likely to cause disruption in trade. It is necessary at times to initiate research and investigations on particular problems. Projects of this sort are often dealt with in association with other Commonwealth and State instrumentalities through the medium of the Australian Agricultural Council.

You will be aware that the Commonwealth has a network of trade and diplomatic posts throughout the world. The Department has standing arrangements with these posts for the supply of information on such things as food laws, food law admin-

istration, quarantine and, indeed, any changes likely to affect the entry and sale of Australian foodstuffs. We find that Australian conditions are not widely known overseas and this often results in restrictive health and quarantine legislation not founded on sound grounds. The Department undertakes negotiations with overseas countries on these questions either through Australian representatives abroad or with the diplomatic representatives of the country concerned in Australia.

These are the sort of activities in which the Department is engaged continuously. As I stated earlier, its operations are, above all, intended to facilitate and protect our trade in foodstuffs. Industry has the responsibility to manage its own affairs and I am convinced that there is no clash of interest between the Department and industry.

CONCLUSION

I hope that a description of these matters has served to illustrate and emphasize the dynamic situation which faces the Australian food industries today. It is pertinent to recall that not very many years ago a vastly different situation existed with practically every foodstuff Australia sold in short supply on the international food markets. Exporters tended to concentrate on a single market and there was a marked tendency towards lowering of quality. Australian products now encounter severe competition and now, more than ever before it is vital that industry should take every advantage of technological progress. The Department places great importance on the application of scientific method to food production and processing. There is clearly room for further extensions of laboratory facilities and scientific quality control in industry.

Commonsense also demands a diversification of markets so that the impact of trade policies and other factors that are adverse to Australia

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should not cause severe disruption of our export trade. This too places a great responsibility on the food industries to adapt themselves to the production of goods to meet a wide variety of tastes.

The food scientist has a vital role not only in Australian industry, but also in the Australian contribution to world food problems. The maintenance and expansion of food supplies is possible only if technological progress make them so. His responsibilities should extend to an understanding of problems in their broadest context and willingness to co-operate with others in a way which will be for the general good.

It is self evident from the enormous strides made in recent years in the production and distribution of foods that the scientist has accepted his challenge with ability and enthusiasm, but it is equally self evident that the magnitude of the growth of population is such that further advances are necessary, perhaps even greater than those already achieved.

CARRAGEENAN

A Useful Food Additive

(Continued from page 745)

jelly having a concentration of gelling agent which makes it satisfactory for eating at room temperature, will be so rubbery at refrigerator temperature that it could not be enjoyed at all when cold.

3. OTHER USES INVOLVING WATER BINDING PROPERTIES

The stabilizing and viscosity increasing properties in water medium are utilized in many products, of which an example is tomato ketchup, where it binds water.

Carrageenan has further diverse uses, and a valuable property is that it can be widely modified to meet many different specifications.

REFERENCES

- (1) Roy Whistler, "Industrial Gums", Academic Press, New York, 1959.
- (2) Rees, D. A., "J.C.S.", 1963, p. 1827.

(3) "Gum Carrageenan", (Monograph), Copenhagen Pectin Factory Ltd., Denmark, Jan., 1963.

(4) Andersen, G. "Milchwissenschaft", 1962, 1775.

SUCCESSFUL WINTER SCHOOL

The School, "*The Foreman in the Food Plant*" held at Hawkesbury Agricultural College from 24th to 28th August, 1964, was attended by forty-five students from 29 firms.

Positions of personnel attending were Foreman (24), Supervisors (5), Production Supervisors (2), Superintendents (2), Inspectors (2), Leading Hands (2), and one each of the following, Asst. Works Manager, Trainee Factory Manager, Product and Research Officer, Technical Officer, Quality Control Officer, Development Chef, Asst. Foreman, Trainee Technologist.

They represented States as follows: New South Wales (22), Victoria (14), Queensland (4), Tasmania (3), South Australia (1), and Western Australia (1).

The School, the sixth since 1959, was officially opened by Dr. V. M. Lewis, Senior Vice-President of the Food Technology Association of New South Wales and closed by Mr. P. Crocker, Junior Vice-President of the Association. Informal features of the school such as the Self Introductory Session, Social and Technical Film evenings contributed significantly to the success of the School.

Discussion following lectures and practical approach of lecturers were appreciated by the students.

A feature of the School which drew a number of the students to it was the emphasis on hygiene. Although meat was also emphasized in the programme, the response by the firms processing or handling meat was less than expected.

By the conduct of these Schools, the Food Technology Association in conjunction with Hawkesbury Agricultural College is providing a valuable opportunity for education of food industry personnel at a vocational level which is not catered for elsewhere.

Merry Xmas



As Christmas and the New Year draw near, we want to say **THANK YOU** for your confidence and co-operation throughout the past year. Of all our assets, the one we value most is the one money cannot buy, the goodwill and friendship of our customers.

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A DIETARY SURVEY OF SCHOOL CHILDREN IN SYDNEY

SUMMARY OF A REPORT OF THE NEW SOUTH WALES STATE NUTRITION COMMITTEE*

A dietary survey of ten-year-old school children in the Sydney metropolitan area was conducted May through July, 1963. A total of 1,163 children participated, 547 girls and 616 boys. Four socio-economic areas of the city were represented.

The boys and girls were of average height and weight for Australian ten-year-olds.

Average calorie intakes for girls ranged from 2,277 to 2,094 and boys from 2,445 to 2,135. The upper socio-economic classes had the higher calorie intakes, however it was felt that the intakes of all the children met their needs.

The average intakes of protein for the four classes met the Recommended Allowance of 11 per cent of the calories as protein when calories are adequate. There were a significant number of children, especially in the lower socio-economic classes which fell below this recommendation and are a cause of concern.

The milk intake ranged from nil to over two pints daily. School milk was not utilized to the best advantage: if it were, protein intake of a good portion of the children falling below the Recommended Allowance would no longer be a cause for concern.

The empty calorie intake, which is a way of measuring the thiamine content of the diet, did not exceed theoretical limits. Children with lower calorie intakes tended to eat fewer empty calories.

RECOMMENDATIONS

1. A survey of the primary schools should be made regarding the consumption of school milk as it is not being used to the best advantage.
2. A nutrition education programme should be directed at specific schools, following this a survey could be made to evaluate the effect of nutrition education on the children's diet.

*From "Food and Nutrition Notes and Reviews", 10, No. 9/10, 1964.

NEW EGG HANDLING PLANT FOR N.S.W.

The N.S.W. Egg Marketing Board will save £48,000 annually as a result of having replaced its obsolete machinery with new ones, as well as adopting more economic policies and using management consultants.

Included in the new machinery are three new English automatic egg packing units installed at Lidcombe, N.S.W., which completes the change-over by the Board to Brecknell, Dolman and Rogers machines.

The benefits expected from the new installations are reductions in costs, breakages and manpower.

The B.D.R. machines provide a continuous loading, candling, grading and packing operation at a maximum speed of 8,500 eggs an hour, a new high in grading and packing eggs.

The B.D.R. is capable of weighing six separate grades of eggs, packs four and counts the total number of eggs processed as well as the number in each pack.

Eight of the Board's 13 country depots have also been equipped with the new machinery.

One of the most modern pasteurizing plants in the world has been installed at the Board's Junee depot where the premises were recently extended.

The new machine at Junee is a significant advance in pasteurizing technique.

Pasteurization is now required by many of the world's major importers of frozen egg and the Junee plant includes pasteurization equipment to cover all frozen products. It is capable of processing both the yolk and albumen of egg in separate but parallel systems, each having a capacity of 125 gallons liquid per hour.

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NEW POPULAR BOOK ON FOOD SCIENCE

A new book by Dr. Magnus Pyke — "*Food Science and Technology*" (John Murray, 30s.) — describes, with a minimum of technical terms and in a most readable and interesting manner, a variety of food processes, why they are used, and what effects they produce.

The products covered include cereals, meat, fish and poultry, dairy products, fats and oils, and fruit and vegetables. Excluded — or at least largely so — are soft drinks, sugar confectionery, and cakes and biscuits.

In a foreword Professor John Hawthorn, of the University of Strathclyde, points out that the concept of food science, with its applications in food technology, has broadened considerably within the space of a very few years, and this is the first attempt that has been made at a genuinely popular survey of an increasingly complex subject. There is little doubt that if it gets into the hands of the general reader it will help to dispel the ignorance and prejudice on which so many of the public's opinions on food are based.

"FOOD ADDITIVE CONTROL IN THE FEDERAL REPUBLIC OF GERMANY"

By Volker Hamann. *Food Additive Control Series 7, Food and Agriculture Organization, Rome. 1963.*

"STANDARDS AND REQUIREMENTS FOR FISH HANDLING, PROCESSING, DISTRIBUTION AND QUALITY CONTROL"

By D. D. Tapiador and J. E. Carroz. *Fisheries Report 9, Food and Agriculture Organization, Rome, 1963.*

"DATES: HANDLING, PROCESSING AND PACKING"

By V. H. W. Dowson and A. Aten. *F.A.O. Agricultural Development Paper No. 72. 392 pages. F.A.O., Rome, 1962.*

This book describes the methods and processes, including the necessary machinery and equipment, which can be used advantageously in modern packing and processing establishments. It gives a general account of the various operations to which the date is subjected between harvesting and delivery from the packing house to the wholesaler and brings together the results of research experience observations made on dates, part of which can be found in publications and part of which doesn't appear to have been previously recorded.

The text is intended primarily for agricultural officers and for those who are responsible for date improvement, handling, processing and packing programmes.

F.H.R.

"FREEZE-DRYING OF FOODS"

A list of selected references by Geraldine A. Corridon. *Library List No. 77, National Agricultural Library, U.S. Department of Agr., Washington, D.C. 1963.*

"U.S. STANDARDS FOR CONDITION OF FOOD CONTAINERS (Tentative)"

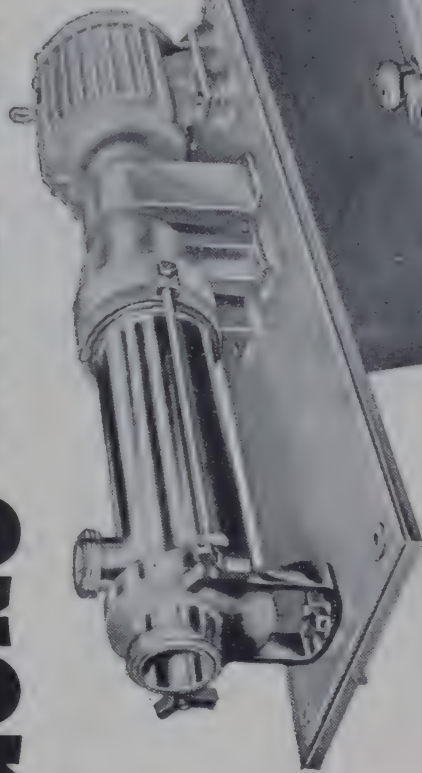
Deputy Administrator, Marketing Services, Agr. Marketing Service, U.S. Department of Agr., Washington, D.C. 1963.

"SHRINK PACKAGING"

Packaging Monograph No. 1, by R. D. Lowry. *Packaging Institute, New York. 1963.*

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• N.Z.: Dalhoff & King (N.Z.) Ltd. AGENTS ALSO throughout Papua & N.G., the Philippines and Taiwan.

"PROCESSING AND UTILIZATION OF ANIMAL BY-PRODUCTS"

By I. Mann. 247 pages. F.A.O. Agricultural Development Paper No. 75. F.A.O., Rome, 1962.

Slaughter facilities in less developed countries, especially rural communities and small townships in the sub-tropical and tropical regions, are usually inadequate. Improvement in the more economic and hygienic handling of slaughter stock and its preservation is not only important from the point of view of food processing, but also for the improved utilization of non-edible animal by-products in various rural industries.

This text is supplementary to other F.A.O. publications which give attention to the problems of improving meat processing techniques, such as F.A.O. Agricultural Development paper No. 70 "*Meat Handling in underdeveloped Countries*" (1960) and F.A.O. Agricultural Study No. 34 "*Meat Hygiene*" (1957).

The author is the Chief of the Animal Industry Project Section of the Department of Veterinary Services of the Kenya Ministry of Agriculture, Animal Husbandry and Water Resources. The book is written with great attention to detail and draws heavily on the author's experience in the setting up of facilities at the village level and in small communities of facilities for the processing and utilization of animal by-products; it is extensively illustrated.

It describes the tools and equipment required, indicates how improvement can be gradually obtained and how, with the use of locally constructed and inexpensive equipment, programmes can be implemented, particularly in countries with prevailing sub-tropical and tropical conditions.

F.H.R.

"GUIDE TO CIVIL DEFENCE MANAGEMENT IN THE FOOD INDUSTRY"

Agriculture Handbook 254, U.S. Department of Agriculture, Washington, D.C. 1963.

"MANUFACTURE AND PACKAGING OF RINDLESS CHEESE FOR EXPORT"

By J. Conochie. 41 pages, C.S.I.R.O., Division of Dairy Research, Melbourne. 1964.

Recommendations of the Rindless Cheese Committee of the Cheese Manufacturers' Federation on the manufacture and packaging of rindless cheese for export.

"SEPARATION METHODS IN BIOCHEMISTRY"

By C. J. O. R. Morris and P. Morris. 896 pages. Pitman & Sons Ltd., London, 1964. £5.15.0.

This book will serve a most useful purpose in bringing together within one volume all the essentials, both theoretical and practical, of the wide variety of separation methods now available to the biochemist. There is no lack of books which deal with individual techniques, but for day-to-day use, and as a work of reference, this volume may well replace all. The authors, who are both in the Department of Experimental Biochemistry at the London Hospital Medical College, have had wide experience in these methods (the senior author has himself made valuable contributions); they do not hesitate to express their own preferences as to method — a matter which on occasion presents some difficulty to those seeking the most appropriate procedure. It is true that since the text was written there have been further valuable developments (e.g., the extended use of *Sephadex* methods), but the book will remain indispensable for a long time. There is an excellent index.

"CITRUS HANDLING AND PACKAGING RESEARCH"

A progress report summarizing the citrus handling research projects in South Australia from 1960-1963, by M. B. Spurling, 15 pages. Agriculture Department of South Australia, Adelaide, 1963.

Meat Preservation Investigations

SPONSORED BY THE AUSTRALIAN MEAT BOARD

In May, 1964, the Board granted a further £500 for meat preservation investigations by the Commonwealth Scientific and Industrial Research Organization. Since 1947, the Board has contributed £10,000 towards these investigations.

In July, 1955, the Board also approved a grant of £7,500 a year for two years to assist the C.S.I.R.O. in establishment of a muscle biochemistry unit. To date, £11,000 of this grant has been paid.

The following report by the C.S.I.R.O. outlines work done during 1963-64:—

1. Meat Quality

The work on meat quality is designed to provide a more detailed knowledge of the properties of meat and of the extent to which these properties are changed by various treatments which the animals may receive before and after slaughter.

The process of glycolysis by which lactic acid is produced from glycogen in the muscle is of particular importance. We know that its course is affected by a number of factors, but we have so far no detailed understanding of why lactic acid production is limited in some circumstances and excessive in others. The normal colour and texture of meat are associated with the normal production of lactic acid. When formation of lactic acid is reduced we get abnormalities of colour and texture such as dark cutting beef, and when it is excessive we may obtain pale, watery meats as is found particularly with pork from certain types of pig.

None of the work on meat quality has yet reached a stage where we can point to obvious benefits to the industry. Nonetheless it is considered to be of great importance to continue studies of the structure

and composition of muscle, as detailed knowledge of these will furnish information of better ways to control such things as tenderness, water holding capacity, and other factors of importance to consumers and manufacturers.

2. Freezer Burn

The studies on freezer burn have confirmed principles established in earlier work on liver and beef muscle. This work has explained for the first time the basic reason why freezer burn occurs in some frozen tissues but not in others. The practice of dipping tissues in solutions of sugars or salts prior to freezing will effectively prevent freezer burn even when alternate methods of preventing evaporation cannot be applied.

3. Microbiology.

The microbiological studies have provided more exact information about the rates of growth of meat spoilage organisms under specified conditions. This knowledge is constantly being used in improving the keeping quality of meats preserved under various conditions. More detailed knowledge of the microorganisms concerned is likely to become increasingly important as the meat processing industry develops and there is a greater demand for products with the greatest possible shelf life.

From the 29th Annual Report of the Australian Meat Board, year ended June 30, 1964.

STARS FOR FROZEN FOODS

Birds Eye Foods in Britain have introduced star rating for frozen foods indicating frozen storage life. One star will indicate storage life of one week at 21°F, two stars one month at 10°F, and three stars three months at 0°F.

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CLEARJEL. Modified waxy maize starch with exceptional clarity and smooth, creamy texture. Unusual resistance to weeping. Little or no starch taste. Provides good production tolerance at low pH's and high temperatures. Cooked preparations will not set to a gel, even on long standing.

INSTANT CLEARJEL. Similar to Clearjel

but requires no cooking before freezing and baking . . . no cooling. Saves time, storage, labour costs. No damage to whole fruit. Excellent freeze-thaw stability. For instant pie fillings with excellent clarity, texture, fruit appearance.

MELOJEL. Refined premium corn starch. Recommended in formulas calling for ordinary corn starch. For cream pie fillings where a gel is desired and clarity not important.

COL-FLO 67. Modified cook-up waxy maize starch. Excellent freeze-thaw stability and resistance to low-temperature storage conditions. Highly resistant to breakdown at low pH and has no tendency to gel. Recommended particularly for frozen fruit fillings where retention of clarity, smoothness of texture and flavour after freezing are important.

PURITY 69. Similar in properties to COL-FLO 67 — but made from a tapioca base and not quite as viscous . . . very bland in taste.

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BOOK REVIEWS

- "CANNED FOODS — AN INTRODUCTION TO THEIR MICROBIOLOGY (BAUMGARTNER)", by A. C. HERSOM and E. D. HULLAND. Fifth Ed., 291 pages, J. A. Churchill Ltd., London, 1963. £1.10.0.

Many food technologists will be familiar with earlier editions of this book. It will suffice to assure them that the same high standards have been maintained in this fifth edition, the first with which J. G. Baumgartner has not been directly associated. Additional information is presented on antibiotics, sampling of cans, and the microbiology of canned cured meats. A chapter devoted to the use of ionizing radiations has been included.

Those not acquainted with Baumgartner will find that the range of subjects covered in the sixteen chapters is far wider than might be assumed from the title. Much of the content is microbiological, commencing with chapters on bacterial and fungal physiology and taxonomy. Then follow good reviews of methods for the control of spoilage micro-organisms. They cover refrigeration, gas storage, moisture limitation, and the use of salt, acids, preservatives and many other techniques. Some of the techniques have obvious importance to the canner in the handling and storage of raw materials before heat processing.

Other essentially microbiological chapters discuss the spoilage organisms of canned foods, effects of heat on micro-organisms, and bacterial food-poisoning.

The practical aspects of canning are not neglected. The manufacture of containers and the operations involved in canning are outlined. A lengthy chapter on principles of canned food processing covers measurement of heat penetration, formulation of processes, processing standards, and aseptic canning.

Chapters which will be most useful in the food laboratory are those dealing with the various types of canned food spoilage, the examination of cans, and the microbiological examination of canned foods, raw materials, and plant and equipment. These are detailed, and lay out clearly the techniques involved and the interpretation of results.

This book, which is well illustrated and printed, and presents extensive references to publications up to 1962, is confidently recommended to food technologists in the canning industry.

Reviewer: Dr. J. H. B. Christian,
C.S.I.R.O., Division of Food Preservation, Ryde, N.S.W.

- "MICROBIOLOGICAL QUALITY OF FOODS", by L. W. SLANETZ, C. O. CHICHESTER, A. R. GAUFIB and Z. J. ORDAL (Eds.). *Proceedings of a Conference held at Franconia, New Hampshire, August, 1962*, 274 pages. Academic Press Inc., New York, London, 1963. \$9.00.

Microbiological standards for foods continue to be a subject of great interest to workers in research, industry and in the various Government bodies.

There is little doubt that standards for micro-organisms in food, whether based on total numbers or the presence of specific types, can be of great importance in improving food quality. The pitfalls involved in the implementing of these standards were highlighted during the papers and the discussions at the Conference on Microbiological Quality of Foods which was held in the U.S.A. in August, 1962.

The presence of such well-known authorities as Mrak, Thatcher, Pederson, Ayres, Dack, Niven, Ingram and many others, has resulted in the publication of a most interesting and worthwhile group of papers.

During the Conference, considerable attention was paid to the types of organism suitable as an index of food quality and the methods available for quantifying them.

The topics dealt with included the detection of specific organisms, including Staphylococci, Faecal Streptococci and Coliforms; Total counts as indices of food quality; Microbial Spoilage of Fresh, Canned, Refrigerated and Dehydrated foods; and finally, Research needs in Food Microbiology, which were discussed from several aspects in four most interesting papers.

One of the features of this book is the publication of critical discussion on each group of papers by a selected authority, as well as the open discussion which followed each paper.

The only weaknesses in the book are the unevenness of the papers presented at the Conference, which appears to be due to different times allotted to contributors, and the absence of any real reference to some of the more recently developed convenience foods and modern processing techniques.

I consider the publication of this book will be of considerable help to all workers in Food Microbiology and should contribute greatly to a better understanding of the methods and purposes of microbiological examination of foods.

Reviewer: A. J. Bardsley, H. J. Heinz Company Australia Ltd., Dandenong, Vic.

- "HYGIENE IN FOOD MANUFACTURING AND HANDLING", by B. GRAHAM-RACK and R. BINSTEAD, 148 pages, Food Trade Press Ltd., London. 1964. £2.0.0.

There is undoubtedly a need for such a general guide to Food Hygiene as this book provides.

It is more than just a resume of simple hygiene rules. As the authors state in Chapter 1 "*Hygiene does not mean just cleaning. It is every aspect that plays a part in ensuring that the final product reaches the*

consumer in the most acceptable and nutritive condition".

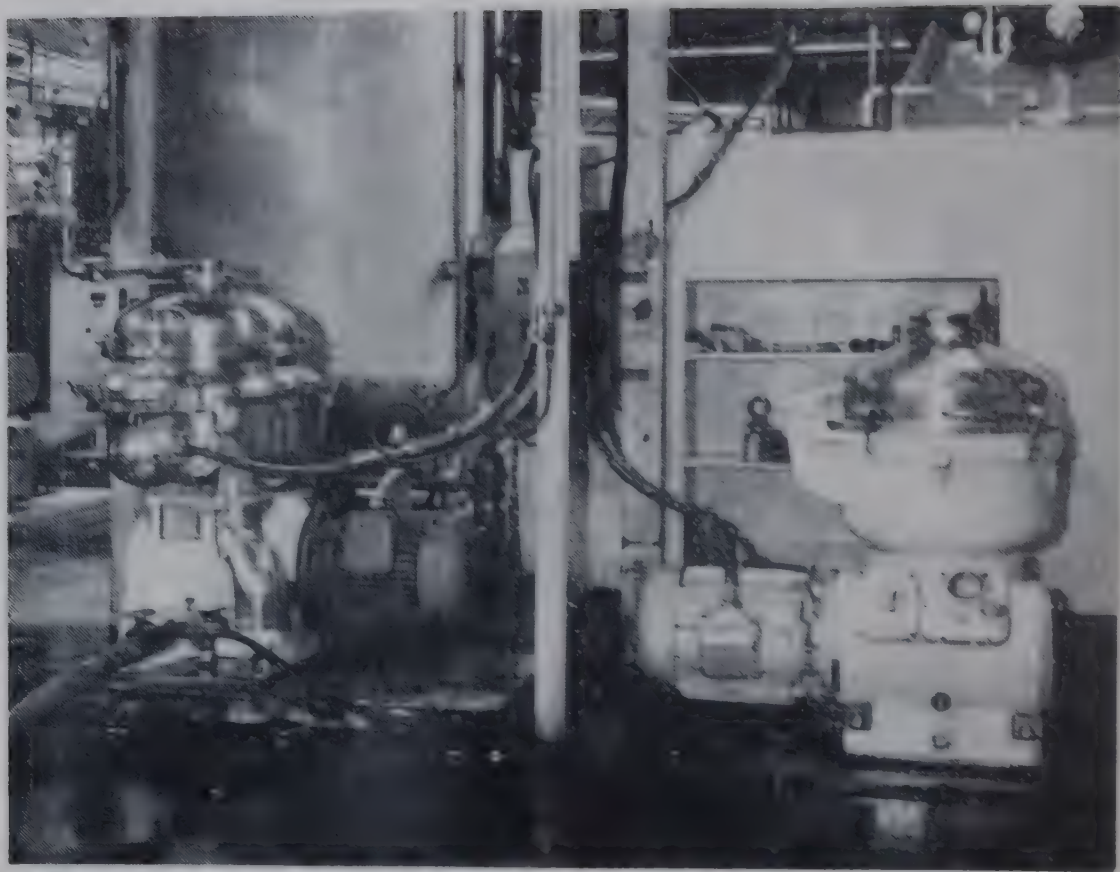
This is a definition of the subject with which I am in complete agreement and the authors are to be congratulated on producing a text book in which they have set a middle course between using strictly academic language and a simplification of scientific terms. The result is a book of general principles which are given in a concise and readable form.

Designed for the use of factory managers, production managers and foremen, every topic in the book is dealt with in a straightforward manner, the authors saying clearly and interestingly what they want to say.

Particular emphasis is placed on explanations and reasons for hygiene in food manufacturing and handling. This is an approach which should particularly appeal to readers who require an elementary introduction to the subject rather than to the Food Technologist, who no doubt would expect a fuller treatment, although I believe that the book is one that will repay study by anyone employed in the food industry.

The book of only 148 pages is divided into thirteen chapters, the first six of which deal with the public health aspects of food handling such as Food Poisoning, Bacteria, Moulds and Yeasts and Food Spoilage. The remaining chapters detail preventive measures necessary to ensure hygienic food manufacturing and handling with, as one would expect, the largest chapter dealing with cleaning methods. Protection of food, construction and layout of plant and equipment and pest control is also dealt with in this section of the book, whilst statutory regulations are given in the last chapter. Although these regulations only apply in the United Kingdom, the principles should nevertheless be followed in this country.

The volume concludes with a list of text books and booklets to assist the reader in his search for further information of this subject.



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I commend this work for its simplicity and consider that all who are concerned with food production will profit from reading it.

Reviewer: W. J. Madgwick, Chief Food Inspector, N.S.W. Department of Public Health, Sydney.

I. F. T.
MEETING

A conjoint meeting between the Australian Society of Dairy Technology, N.S.W. Division, and the I.F.T. Australia Northern Section was held at C.S.I.R.O., Division of Food Preservation Laboratories, Ryde, N.S.W., on Tuesday, 13th October. More than one hundred people were present to enjoy an excellent buffet dinner, and to hear Mr. R. A. Buchanan, of the C.S.I.R.O., Division of Dairy Research, Highett, Vic., speak on the work being carried out on New Foods at the Division.

AUSTRALIAN AWARD

The Northern & Southern Australia Sections of the Institute of Food Technologists, The Professional Society of Food Technologists, are calling for nominations for the Annual Australian Award.

This Award is granted annually by the Australia Northern and Southern Sections of the Institute

for the purpose of encouraging and recognizing outstanding achievement in food technology in Australia. The Award is made for meritorious contributions to the advancement of food technology in Australia, such contribution may be made in any of the fields of research, quality control, production, engineering administration, education or the organization of professional activities.

Nominations should be forwarded to the Secretary of one of the Sections by 31st December.

FREEZE DRYING PLANT
INSTALLATIONS IN
AUSTRALIA

Freeze drying equipment, produced by Vickers-Armstrong (Engineers) Ltd. will be installed in Australia as follows:—

Pilot units (A.F.D., capacity 35 lb/day) costing approximately £10,000: Egg Marketing Board (Sydney), Royal Melbourne Institute of Technology, and S.A. Department of Industrial Development.

Production unit (infra-red radiant heating, capacity approx. 1 ton/day): Carlton and United Breweries Ltd., Melbourne.

A small experimental freeze drying unit, also supplied by Vickers, has been installed for two years at the Army Food Research Unit, Scottsdale, Tasmania.

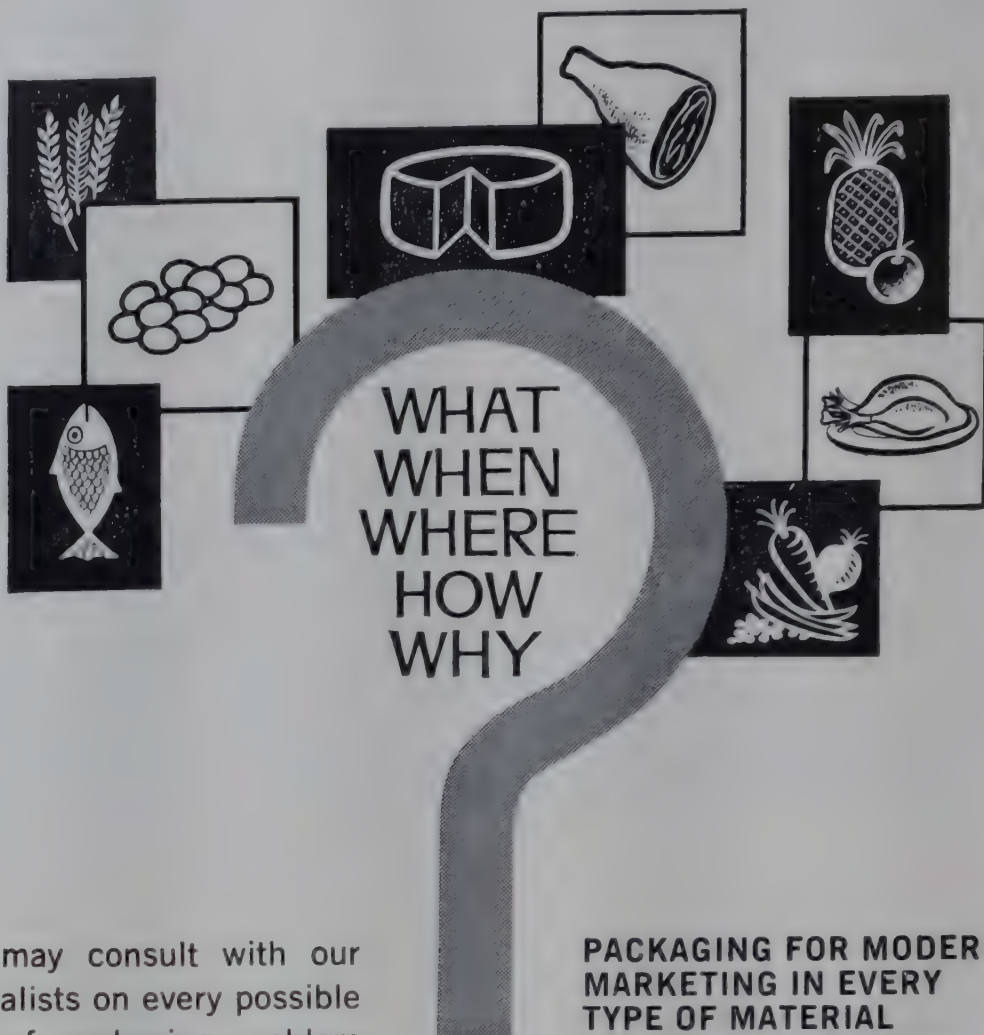
AUSTRALIAN PRODUCTION STATISTICS
MALT AND BEER PRODUCED

The figures for 1961-62 and 1962-63 are derived from the Annual Factory Census. It should be noted that, in some cases returns are accepted from factories for a year other than the normal financial year ending on 30th June.

Period		Malt Produced (All Types)	Breweries (a)			
			Malt Used	Sugar Used	Hops Used	Beer Brewed
		'000 bus. of 40 lb	'000 bus. of 40 lb	'000 cwt.	'000 lb	'000 gal.
Year	1961-62	10,360	6,910	881.1	4,375	241,636
	1962-63	10,535	6,604	926.3	4,279	249,454
	1963-64	11,994	7,400	942.2	4,306	269,972

Annual totals for 1962-63 and earlier years are obtained from Annual Factory returns and do not include waste beer.

K. M. ARCHER, Commonwealth Statistician.
Commonwealth Bureau of Census and Statistics, Canberra, A.C.T.



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NEW

Recommended Dietary Allowances

The ease of modern living and an accompanying decrease in rigorous physical activity for most Americans has led the Food and Nutrition Board of the National Academy of Sciences — National Research Council to lower its recommended daily calorie allowances for adults.

In a revision of the Board's *Recommended Dietary Allowances*, just issued, the calorie requirement of the *reference man* (25 years old, 154 pounds, and moderately active) has been reduced to 2,900 calories daily from the 3,200-calorie diet recommended for the same man in 1958. Similarly, the diet of the *reference woman* (25 years old, 128 pounds, and moderately active) has been lowered to a suggested 2,100 calories per day from the 1958 recommendation of 2,300 calories. The recommended daily levels for the nutrients thiamin, niacin, and riboflavin, which are based on calorie requirements, have also been reduced.

The Food and Nutrition Board's suggested caloric and nutrient allowances are used widely by the armed services, schools, hospitals, summer camps, prisons, and other public and private institutions as a guide to good nutrition.

The first edition of *Recommended Dietary Allowances* was published by the Board in 1943, in an effort to establish nutritional levels that could maintain the well-being of essentially all healthy persons in the

United States under current conditions in living. The five revisions since then have taken into account one or more of the following four factors:—

- evaluation of new research information and the discovery of new methods of determining nutritional requirements;

- shifts in types of available food;

- changes in environmental conditions;

- changes in patterns of living.

The decreased calorie requirements in the present revision reflect both the Food and Nutrition Board's growing concern over the fact that a considerable segment of our adult population is overweight and its belief that today's average American exerts much less energy than the 1958 reference man. This standard was first defined by the Food and Agricultural Organization (F.A.O.) of the United Nations in 1950 as a basis for world-wide determinations of nutritional allowances. While both the 1958 and 1964 reference men are assumed to be gainfully employed 8 hours a day, the F.A.O. reference man is subject to occasional bursts of hard physical labour which are probably rare in this country. Also, the reference man in the United States probably does not spend as much time walking or engaging in household work and recreation as does the F.A.O. man.

An interesting addition to the new revision is the inclusion of *alcohol* in the consideration of nutrients for which specific requirements or effects have not been tabulated. It has been estimated on a per capita basis that Americans consume 76 calories of alcohol per day, making this substance an important factor in the consideration of caloric in-

Publication 1146 of the National Academy of Sciences — National Research Council. 59 pages. Available from the Printing and Publishing Office, N.A.S.-N.R.C., 2101 Constitution Avenue, N.W., Washington, D.C. 1963. \$1.00.

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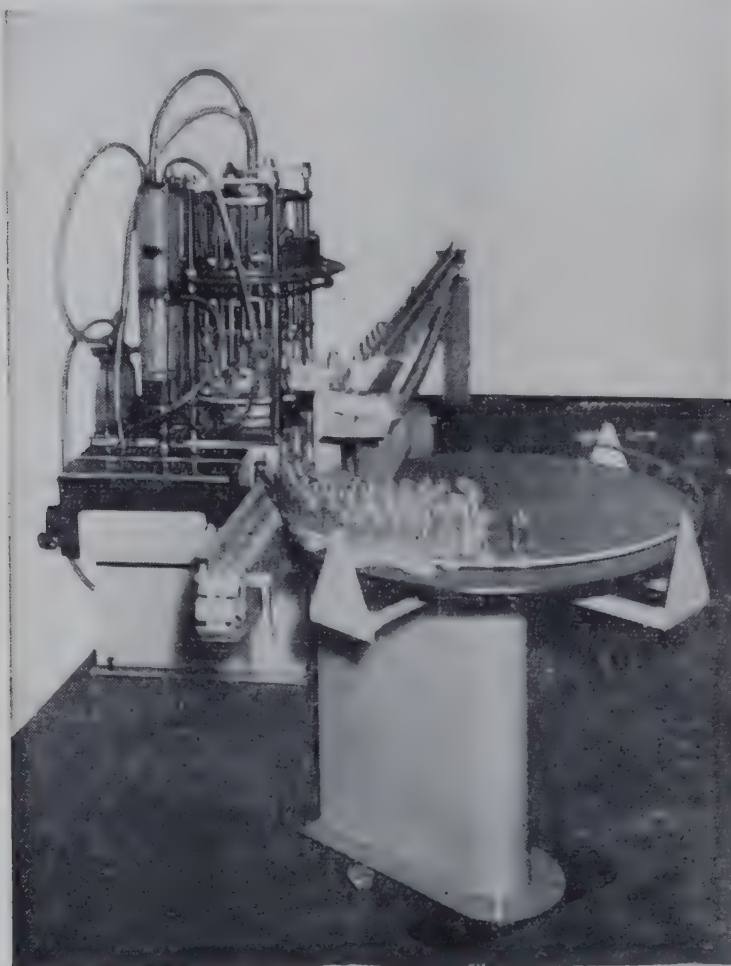
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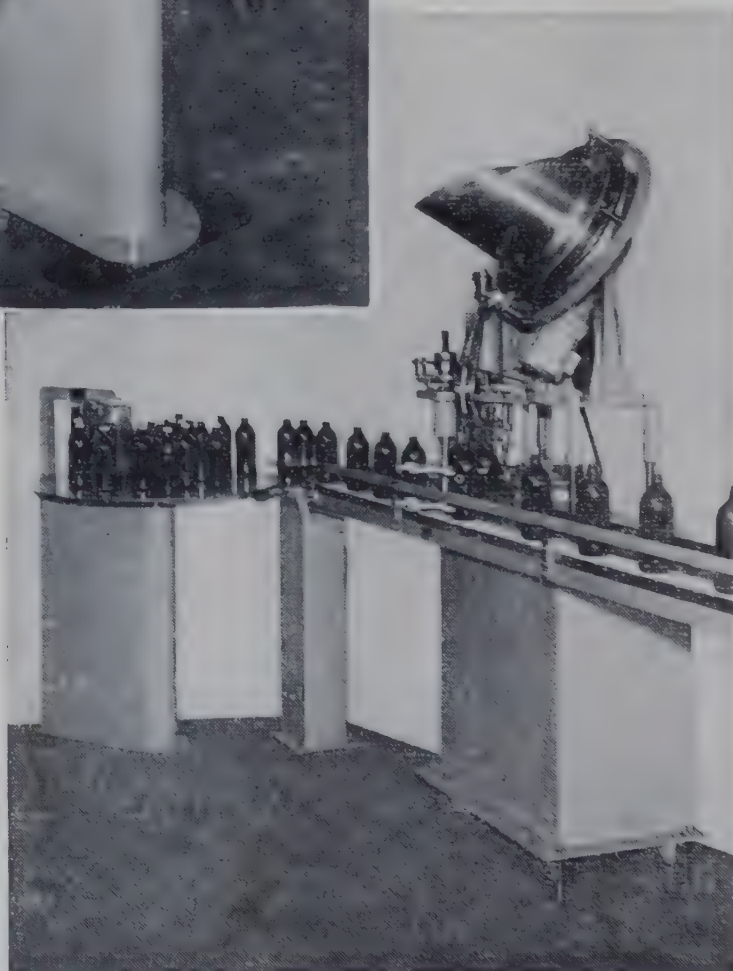
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take. Since this estimate includes children and other non-users, the actual intake of the remaining population is actually much higher. The report points out that while alcohol in small quantities may be converted into energy, a high alcohol content diet will displace other important nutrients, accounting at least partially for the metabolic ailments associated with chronic alcoholism.

The third principal change in the revised allowances is a decrease in the recommended calcium for children between the ages of one and nine years from 1.0 gram to 0.8 gram, based on a re-examination of the daily calcium required to build the skeleton. Recently published observations and a recalculation of previously published material has also prompted a decrease in the calcium recommendation for women in the second and third trimester of pregnancy, from 0.7 gram to 0.5 gram over usual diet levels. Levels have also been reduced for lactating women from 1.2 gram to 0.5 gram over the usual requirement.

The recommended allowances in the Food and Nutrition Board's report represent the consensus of leading nutritionists and biochemists. The Board establishes nutrient levels high enough above average physical requirements to cover variations among most Americans today. Although often incorrectly used as inflexible standards rather than guides, the allowances do *not* necessarily reflect the nutritional needs of any one person or group, since these can be judged only after careful physical, biochemical, and clinical evaluations have been made.

A new feature of the revision is a comparative tabulation of dietary standards for adults in 11 countries.

The Food and Nutrition Board was established in 1940 under the Division of Biology and Agriculture of the (U.S.) National Academy of Sciences — National Research Council. It serves as an advisory body in the field of food and nutrition, promotes needed research, and helps to interpret nutritional science in the interests of the public welfare.

F. T. A. of Victoria

The Food Technology Association of Victoria on the 15th October, held a Cutting Bee, followed by a Buffet Dinner. The subject of the Cutting Bee was "*Savoury Type Prepared Foods*" and "*Quick Setting Desserts*".

Members were also asked to assess Polish Raspberry and Black-currant Wines. A short address was given on the ever-increasing use of Prepared Foods and their adaptability to present-day living conditions.

Baccon Irradiation: F.D.A. O.Ks. Cesium

The U.S. Food & Drug Administration has approved the use of Cs-137 in addition to Co-60 for the radiation preservation of bacon.

An old error is always more popular than a new truth.

— German Proverb

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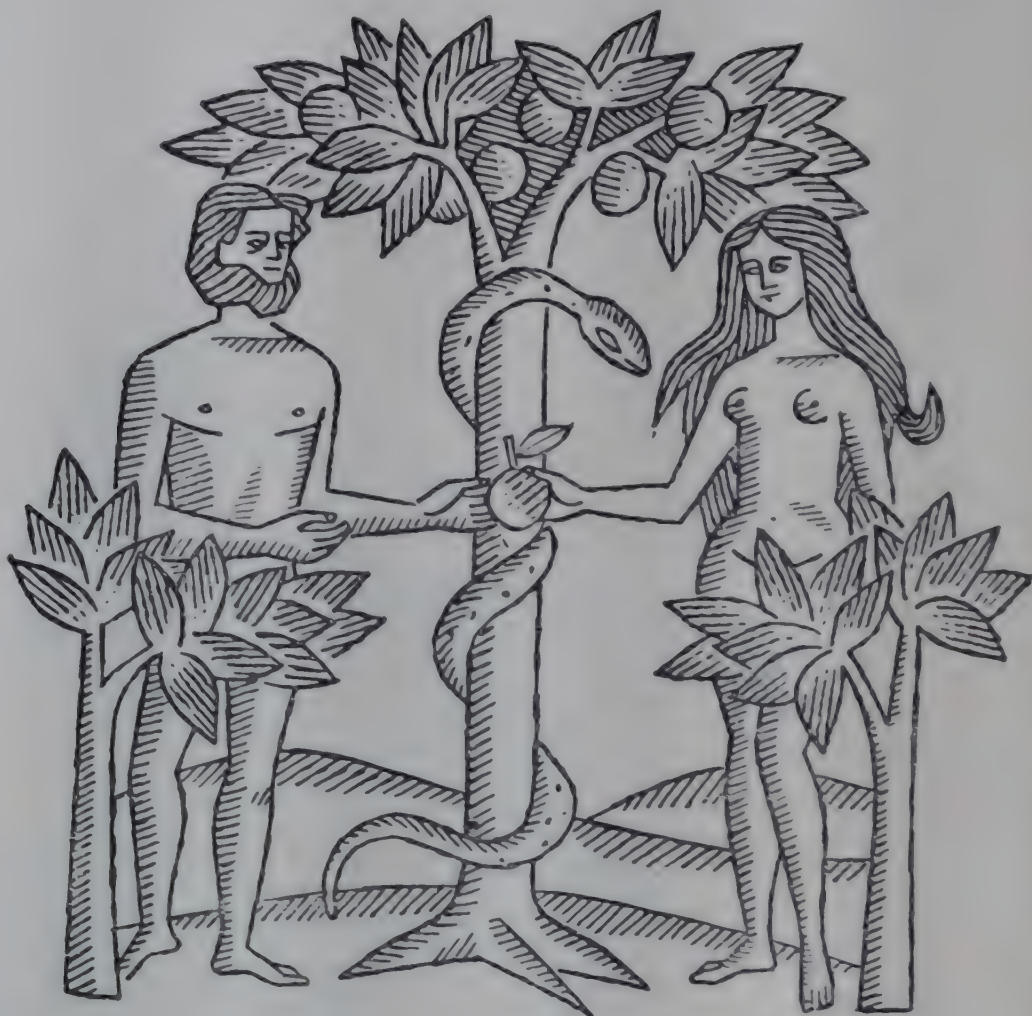
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Codex Alimentarius

Progress Report on Processed Fruit and Vegetables

The first meeting of the world-wide Expert Committee, established by the F.A.O./W.H.O. Codex Alimentarius Commission, to work on the development of international standards for processed fruits and vegetables, was held in Washington, D.C., U.S.A., on May 29 and 30, 1964.

The Committee formulated and agreed on broad definitions for the various categories or types of processed fruits and vegetables and reached agreement on the type of standards that should be developed initially. The plans agreed upon call for development of platform type or minimum requirements standards with the understanding that for certain commodities more than

one level of quality above the minimum may be developed.

A basic outline of a standard for an individual product was suggested to cover the following main divisions, with subordinate subdivisions as may be appropriate for the product or product grouping:

1. Product Description and Designation.
2. Additions and Additives.
3. Quality.
4. Fill of Container.
5. Tolerances.
6. Sampling and Test Procedures.
7. Container Labelling.

Preparatory work on draft standards was assigned to the following sub-committees:—

CANNED FRUITS

Commodity	Assigned to	To collaborate with
1. Peaches	United States	Australia, South Africa
2. Fruit Salad	Australia	United States
3. Fruit Cocktail	United States	Australia
4. Pineapple	South Africa	United States
5. Applesauce	Canada	Netherlands, United States
6. Grapefruit Sections	Israel	United States
7. Plums	United Kingdom	Netherlands
8. Strawberries	Netherlands	United Kingdom
9. Raspberries	United Kingdom	Netherlands

CANNED VEGETABLES

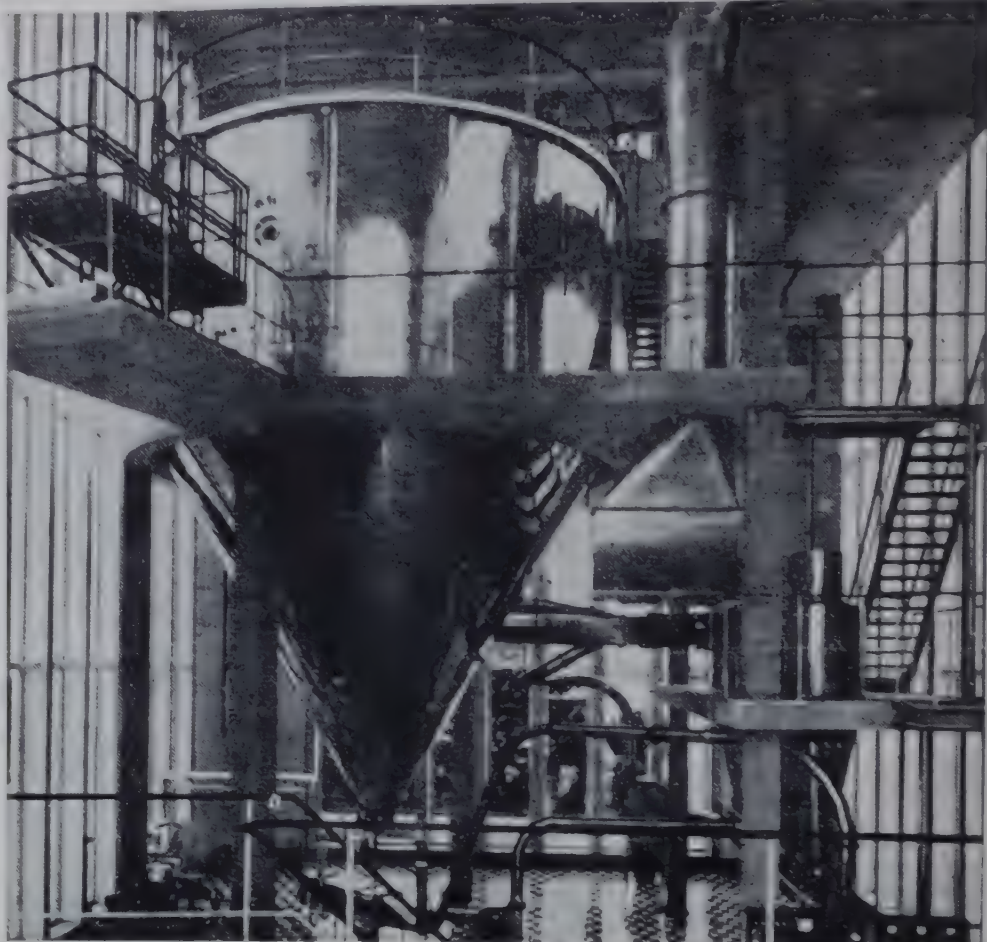
Commodity	Assigned to	To collaborate with
1. Asparagus	Netherlands	Denmark, United States
2. Peas	United Kingdom	Sweden, Netherlands, Denmark
3. Green and Wax Beans	Canada	United States
4. Sweet Corn	Canada	United States
5. Tomatoes	United States	Canada, Australia
		Italy (Consult)

OTHER PRODUCTS

Commodity	Assigned to	To collaborate with
1. Jams	United Kingdom	Switzerland, Netherlands
2. Dried Vine Fruits: Start with Raisins- Sultanas	United States	Australia

OTHER VOLUNTEER WORK ASSIGNMENTS

Task	Assigned to	To collaborate with
Sampling Procedures (See Report on Meeting for details of task)	United States	Sweden, Australia, United Kingdom
Collect Data on Syrup Strength ingoing and outgoing (See Report on Meeting for details of task).	Australia, Canada, Israel, Netherlands, South Africa, United States	Transmit data to Chairman by September 1, 1964. (Chairman now suggests that January 1, 1965, is as early as this would be expected.)
Container Sizes	United Kingdom	
	Delegate from Poland, also representing I.S.O., is to send each country participating in the Washington meeting a list of the I.S.O. container sizes.	



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It was the consensus of the delegates that this committee should not undertake standards for dried prunes at this time since the E.C.E. is now working on standards for this product even though they are regional in scope. It was further the general view that the committee would favour bringing the matter to the attention of the Commission with a recommendation that standards for dried prunes be handled on a joint basis with the E.C.E., if such an arrangement could be suitably made.

It was the general consensus of the committee that it should be willing to assume the standardization responsibility for pulses. There being some uncertainty on the question, the Chairman stated the matter would be referred to the Commission for a decision as to whether this committee should assume standards responsibility for these products. The Definition of Dried Fruits and Vegetables was revised so that it would include mature (dry) seed of certain legumes, such as pulses, in case the Commission rules this committee should handle them.

DAIRY INDUSTRY RESEARCH

The Acting Minister for Primary Industry has announced that he had approved the allocation of £296,000 from the Dairy Research Trust Account for the programme of research for 1964-65 submitted by the A.D.P.B. The allocation for 1963-64 was £307,000.

Funds for research are raised by a statutory levy on all butter and cheese manufactured in Australia. The current rates of levy are 1/16d. per lb on butter and 1/32d. per lb on cheese. On all approved research projects, the Commonwealth Government grants a subsidy of £1 for £1 against funds raised by the levy.

The A.D.P.B. is advised on its research recommendation by the Dairy Produce Research Committee, which has its own specialist technical sub-committee to give preliminary consideration of manufacturing and research matters. The Committee is composed of six Board mem-

bers and one representative each from the Australian Agricultural Council, the Department of Primary Industry and the C.S.I.R.O.

The research programme covers a wide range of projects. At the farm level, research is being conducted into problems relating to farm management, animal husbandry, pastures, disease and pest control. On the manufacturing side, investigations are being carried out into various aspects of butter and cheese making, casein, and recombined dairy products. A comprehensive survey of the market requirements for dairy products in Australia has been undertaken and further studies, both of the domestic market and export markets, are envisaged.

THE DUTCH MARGARINE SICKNESS

A so-called margarine sickness outbreak which occurred in Holland some years ago was attributed at the time to an additive to the margarine — an emulsifier. In an article in the *"Journal of Food and Cosmetics Toxicology"*, (1, 92, 1963) the author considers the evidence and concludes that the outbreak was not caused directly or indirectly by the margarine emulsifier.

EDITORIAL

(Continued from page 729)

C.A.F.T.A. and the State F.T.A.'s save industry many, many thousands of pounds per annum in bringing about a uniformity of State Health regulations. There is no need to elaborate on the savings, yet our associations are manned in most instances by people who are willing to give their time voluntarily for this goal. The cost to the food industry averages just over £10 per member company per annum, a ridiculously low figure for so affluent an industry. Remember, nowhere else in the world is the food industry allowed a say in writing its own regulations. So let us make our new year resolution to increase our influence further in the field of na-

— Continued on page 784

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RECENT ADVANCES IN FOOD DEHYDRATION OTHER THAN FREEZE-DRYING

At the second meeting of the Food Engineering Panel of the Food Group of the Society of Chemical Industry, held at the Society's headquarters on January 22, 1964, the speaker was Mr. G. Evans of Unilever Research Laboratories, who delivered his paper, "*Recent Advances in Food Dehydration Other than Freeze-Drying*".

Mr. Evans said that the object of his paper was to bring to notice recent advances (defined as having taken place in the last decade or so) in food dehydration, apart from freeze drying, in two broad fields, *i.e.* food powders (and flakes) and food particulates, which had resulted from the close co-operation of engineers, biochemists, biologists and chemists.

Potato powders and flakelets, which had had a somewhat infamous reputation, had now seen very successful marketing ventures based on products of recent developments. Among these were the improved granule process (*i.e.* a modification of the war-time add-back process) developed by the U.S.D.A. Western Regional Laboratory, involving air or drum drying followed by fluidized bed-drying; and the flake process of the Eastern Regional Laboratory, requiring the use of glyceryl monostearate additive. As such, these methods gave rather low bulk densities of product (about 25 lbs/cu. ft.), but capable of density improvement by additional processing, as in a special granulator. The Asselberg process from Canada, and the Birs spray-drying process (as used on potato mash, usually with skim milk powder) were mentioned.

Advances in spray drying methods generally, the speaker considered, were towards the use of higher inlet temperatures and shorter drying times, evidenced in the use of the Venturi Spray Dryer (patented in

Belgium); or towards longer drying times and lower inlet temperatures, exemplified by the Birs *No-heat* Dryer, invented by Dr. Hussman in Italy, now carrying world-wide patents. The inlet temperature is no greater than 35°C, but with very dry air (*i.e.* wet-bulb about -10°C) requiring a retention time between 50 and 200 seconds in a very tall tower (for example, 210 ft. high). The moisture content may be brought down to 3-5 per cent, or as required for satisfactory storage, by fluidized bed drying. A production size tower is in commercial operation in Sienna for tomato powder, another in Burgdorf, Switzerland, and a further soon to be commissioned for drying potato mash near Bremen. The plant has been described in more detail elsewhere. Mr. Evans quoted a figure of about £350,000 capital cost for a 1000 litres/hour evaporative capacity plant. The Bertuzzi dryer was another new spray dryer type of interest, so far believed only at the pilot scale, which was based upon spray drying under reduced pressure (about 0.1 atmosphere) in an atmosphere of superheated water vapour (about 200°C). A powder of about 3% moisture was possible. Arrangements are made for the withdrawal of water vapour, its condensation and return to the system. Foam-mater drying was then described by Mr. Evans, followed by vacuum drying on the continuous high vacuum belt dehydrator, and the Vacuum Fat drying method developed by Greenfield.

In the drying of food particulates (either as grown, or as dice), the main advances, apart from the better understanding of the bio-chemical and biological changes which took place during and after drying, were the introduction of agitated beds and methods for reducing the resistance of the moisture path to the evaporating surface. This was

especially evident in the dehydration of pre-picked peas. A patented process using this method of careful puncturing of peas with a pin, scale in this country. The resultant is now carried out on a commercial dried product dehydrates very quickly. Manufacture has depended upon the successful design of a machine capable of individually pricking peas at a high throughput (*i.e.* of the order of 2½ million per hour, or one ton). Every pea has to be pricked only once with a small hole about 0.05 in. in diameter, penetrating through the outer skin into the cotyledon without bruising or damaging. The dehydration is carried out in fluidized bed dryers. One of the main problems associated with the air dehydration of vegetables is the considerable shrinkage that takes place, and hence of difficulty in reconstitution. A method of avoidance which is promising, is that of intermediate moisture puff-drying, as developed in the U.S.A., involving the use of a puffing gun at around 25-30 psig pressure.

The moisture content of the product at this stage is between 30-40 per cent, and a final moisture content is then obtained by conventional means again. Agitated Fluid bed systems, particularly the belt trough dryer in the U.S.A., are now used commercially for drying diced vegetables. A typical commercial agitated fluid bed dryer for drying peas, brings the moisture content down from 80 per cent to 20 per cent in about three hours. The peas then require to be bin-dried to 7 per cent moisture, at which content they are stable for 12 months in temperate conditions. There is however an unresolved problem in providing a method for drying peas down to 5 per cent moisture as would be required for tropical or semi-tropical storage; the use of in-can desiccants was discussed.

Finally, Mr. Evans dealt with a number of concentration methods for liquids, slurries and purees, such

as the film evaporators, scraped surface, centrifugal, and plate evaporators. The paper was very fully interspersed with slides of diagrams and equipment.

From "Chemistry & Industry", April 4, 1964.

EDITORIAL - - -

(Continued from page 781)

tional and international Pure Food Administration by bringing in companies who can help us to assure a still brighter future.

A Merry Christmas and Happy New Year to all.

N. M. GOW,
Federal President,
C.A.F.T.A.

F.T.A. of Q'ld

The Food Technology Association of Queensland, held its first Technical Luncheon at Lennons Hotel, Brisbane, on Tuesday, 13th October, 1964.

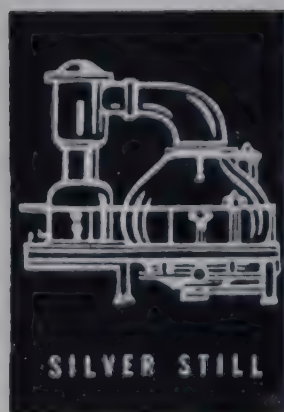
The guest speaker was the Hon. A. W. Munro, M.L.A., Deputy Premier of Queensland, and Minister for Industrial Development, who spoke to some fifty members on impressions from his recent trip overseas.

Mr. Munro said that it was the case with a number of the Far Eastern Countries that whilst they had the capital to develop secondary Industries, the technical knowledge and experience was lacking, and this was an excellent opportunity for Australian Companies to extend their activities into this area, by supplying such *know-how*.

It is planned that these luncheons be held approximately every two months, and the committee has organized its second function for Tuesday, 17th November, 1964, when the Guest speaker will be Professor V. B. D. Skerman, D.Sc., Professor of Microbiology at the Queensland University. Professor Skerman is a world authority on the classifications of micro-organisms, and has just returned from a world congress, on this subject held in Quebec.

GREETINGS

• • •



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Wheat Research Unit, Ryde, N.S.W.

SUMMARY OF ANNUAL REPORT, 1963-64,

By M. V. TRACEY

The main research effort of the Unit remains directed towards the fractionation of gluten proteins on a scale large enough for quality testing. During the year the chromatographic method previously used for separations on a small scale has been considerably improved but is still not suitable for the preparation of single electrophoretically pure preparations of each of the gluten components. Gel electrophoresis on both starch and polyacrylamide has continued to be used as a tool for the assessment of the efficiency of protein separations by a variety of chromatographic methods. While much has already been learned of the properties of the individual protein components, the principal end of the work is to prepare enough of each to allow an assessment to be made, if possible, of their effects, either individually or in combination, on baking quality.

During the past year an examination was made of the possibility that cereal gums have importance in baking behaviour of flour. This preliminary work, which has been completed, shows that in Australian flours, the hydrolysis of some gum components causes a drop of 10 per cent in loaf volume on baking and that plant gums may be used to modify undesirable qualities in some overstable flours.

Fractionation of the pentosans by chromatography on DEAE cellulose showed that treatment with snail digestive juice (a good source of polysaccharases) completely removes an arabogalactan component while two other components, an

araboxylan and a galacto-araboxylan are partly degraded.

During studies on the effect of adding various polysaccharides to reconstituted gluten-starch doughs it was found that the polycation chitosan (a partially deacetylated chitin) is a potent inhibitor of yeast fermentation. Chitosan at a concentration of 3 ppm inhibits completely a 0.1 per cent suspension of yeast fermenting anaerobically in 5 per cent glucose. The inhibition by chitosan appears to be a surface reaction which hinders the entry of glucose (or other sugar substrates of similar size) into the cell by the formation of a layer of chitosan held by electrostatic interaction between $-NH_3^+$ groups of the chitosan and anionic groups on the cell wall.

Gel electrophoresis has been carried out on the proteins extracted from individual grains of single ears of wheat of the varieties Gabo and Spica. There was no variation in the general pattern shown by individual grains of the same variety and moreover the profiles obtained were similar to those obtained on larger samples or on flour milled from the corresponding wheat variety.

Gel filtration of acetic acid soluble gluten proteins on Sephadex G100 results in a separation of the applied protein into three main classes. Repeated refractionation with the column under the same conditions enables a number (about 8) of fractions to be prepared which behave as single entities on re-running. Starch gel electrophoresis shows that while there is little

tailing between fractions such as occurred in the earlier C.M.C. fractionations the peaks themselves contain a number of components though in some instance this number may be as low as two.

Exclusion chromatography using Sephadex gels is a comparatively recently developed technique and many of the results obtained in the fractionations described were difficult to interpret in relation to results from the use of other techniques both in the Unit and other laboratories. Several workers on the gel filtration of proteins have reported the occurrence of asymmetric zones in the elution of proteins for which other techniques have shown no evidence of heterogeneity in terms of molecular size. The results obtained with monomeric bovine serum albumin, ovalbumin, soybean trypsin inhibitor and lysozyme have all been qualitatively similar in that the trailing edge of the zone is sharper than its advancing counterpart. Using ovalbumin on *Sephadex G-100* as a model system

it has been shown that the asymmetry arises from concentration dependence of the partition co-efficient.

The presence of rapid, reversible association in proteins is usually demonstrated by either sedimentation velocity or electrophoretic experiments. A chromatographic procedure employing *Sephadex G-100* has now been developed whereby similar qualitative information may be obtained.

Seven samples of polished rice varieties received from the C.S.I.R.O. Coastal Plains Research Station and the New South Wales Department of Agriculture have been examined by methods developed for use on wheat. The methods used were not entirely suitable and are being modified. It seems clear however that rice proteins are to some extent characteristic of varieties and that useful information on the basis of rice quality might be obtained by using these methods, modified as may prove necessary.

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FREEDOM FROM HUNGER — IS IT A POSSIBILITY IN THIS WORLD?

Under the auspices of the Food Science Undergraduates Association of the University of N.S.W., a symposium was held in the University of N.S.W. Union on July 21st, 1964 on the topic: "*Freedom from Hunger — is it a Possibility in this World?*"

The topic was introduced by Mr. C. Jehne, fourth year student in the Food Technology course. Other speakers were: Professor C. W. A. Macmillan, Dean of the Faculty of Agriculture, Sydney University, and Chairman of the N.S.W. State Committee of the Freedom from Hunger Campaign on "*The effect of and extent to which the Freedom from Hunger Campaign will aid food production*". Mr. J. F. Kefford, C.S.I.R.O. Division of Food Preservation, Ryde, spoke on "*Application of modern principles of food preservation and utilization to indigenous foods*", and Professor F. H. Reuter, University of New South Wales, on "*Sociological implications of Aid to increase food production in under-developed countries*".

MICROBIOLOGICAL SPOILAGE PROBLEMS OF DEHYDRATED FOODS

A discussion of spoilage of dehydrated foods in general shows the major problems are not concerned with the growth in the adequately dried product of micro-organisms with low water requirements. Such strains are a problem in fruit concentrates and syrups. Spoilage of dehydrated foods is generally the result of microbial growth in the product prior to or during removal of water. Control of such spoilage requires a careful sanitation and consideration of the relationship between time, temperature, and the water activity of the food at all stages of manufacture.

J. H. B. Christian, in "*Microbiological Quality of Foods*", pages 223-228, Academic Press, New York, 1963.

FOOD TECHNOLOGY CENTRE FOR MYSORE

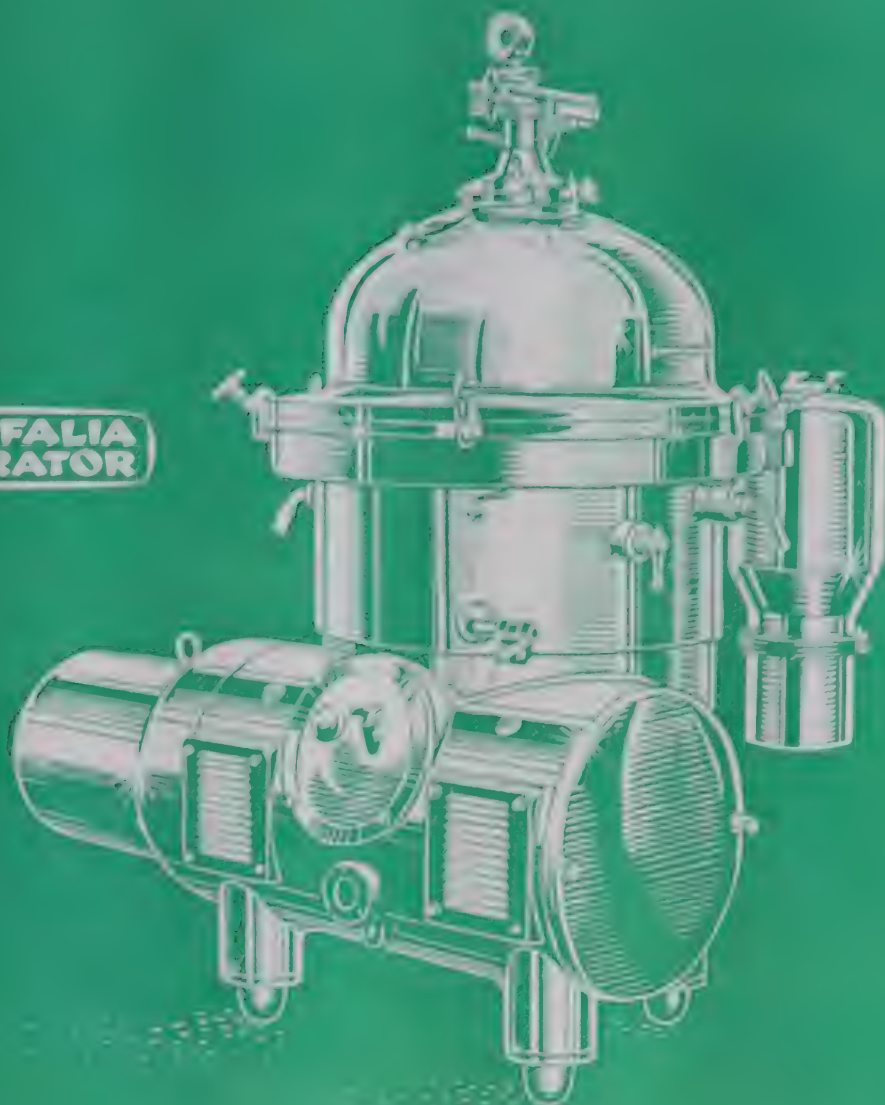
An agreement has been signed by the F.A.O. and the Government of India to open an International Food Technology Training Centre at Mysore, to train personnel in methods of food processing, packaging and storage. It will be financed by the Canadian Freedom-from-Hunger Campaign Committee, and trainees will come from about a dozen Far Eastern countries.

F.A.O. has promised to support the centre for at least three years, with F.F.H.C. funds provided by Canada, up to a total of \$300,000 to \$400,000. To date, \$70,000 has been raised in Canada and a director is being recruited to start the centre this year. Courses at various levels are to be provided, including training for senior executives, basic training in food science and technology at various levels of skills, orientation courses in specific subjects, and some training in food research.

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